# The Refrigeration Service Engineer



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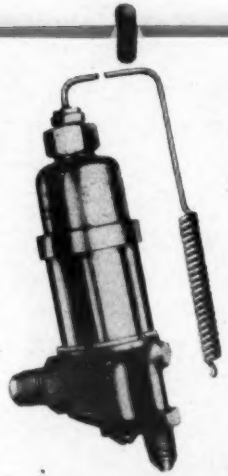
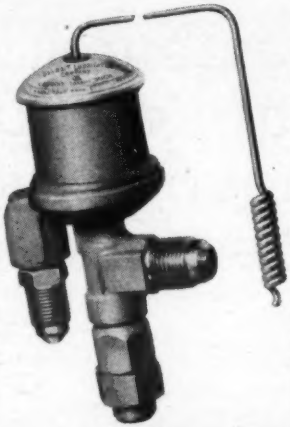
Gas-Charging—are advantages which have earned this preference. 2643



### No. 673—"The Standard of the Refrigeration Industry"

"Detroit" No. 673 has a long record of dependable performance in a wide variety of installations, and has been, for many years, "the standard of the refrigeration industry." Designed for average-size commercial and air conditioning installations. Sensitive and accurate in operation—gas-charged for instant response and reduction of motor load during pull-down cycle. Duraflex bellows and Delubaloy needles and seats resist corrosion and assure long life.



### No. 573—The Same Superior Performance as the No. 673 for Smaller Installations

The "Detroit" No. 573 has been produced in response to a demand for a valve for smaller installations which would have the performance of the "Detroit" No. 673.

No. 573 has the same operating characteristics—the same dependability and adaptability as the 673. Designed for small commercial installations, its double diaphragm construction with gas-charged power element permits close superheat control at low suction pressures and provides motor over-load protection in its simplest, most effective form, using only one power element.

**UNIT NUMBERS OF No. 673 VALVE**

Use "Detroit" Unit Numbers when ordering these stock items from your "Detroit" Wholesaler.

| Unit No. | Refrigerant | Max. Pressure | Connections |
|---|---|---|---|
| 6731968 | Freon-12 | 15 | *Inlet:* ⅜" SAE for ⅜" x ¼" Reducing Nut. *Outlet:* ½" SAE |
| 6731428 | Freon-12 | 55 | |
| 6731563 | Methyl | 10 | |
| 6731411 | Methyl | 40 | |

*Rated at 1-ton Freon-12 or 2-ton Methyl.*

**UNIT NUMBERS OF No. 573 VALVE**

Use "Detroit" Unit Numbers when ordering these stock items from your "Detroit" Wholesaler.

| Unit No. | Refrigerant | Max. Pressure | Connections |
|---|---|---|---|
| 57300 | Freon-12 | 45 | *Inlet:* ⅜" SAE for ⅜" x ¼" Reducing Nut *Outlet:* ½" SAE for ½" x ⅜" Reducing Nut |
| 57309 | Freon-12 | 10 | |
| 57311 | Methyl | 35 | |
| 57315 | Methyl | 5 | |

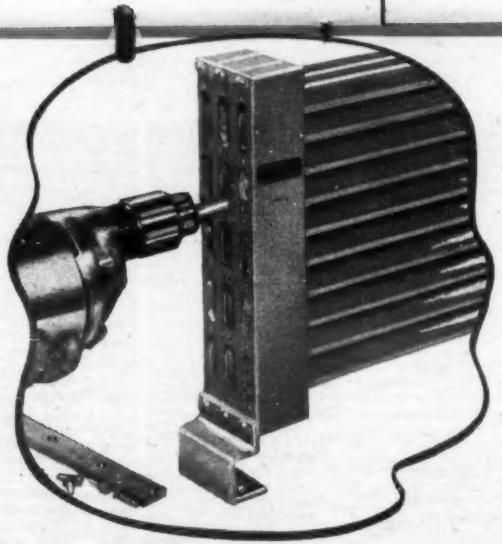
*Rated at ½-ton Freon-12 or .9-ton Methyl.*

# DOUBLE-TUBE COUNTER-FLOW CLEANABLE WATER-COOLED CONDENSERS

Unit pictured
5 H.P.

*Seamless Copper Tubes*
*Brass Headers Machined and Brazed*

## HM condensers are more economical because they're cleanable!



JOBBERS in all principal cities carry HM condensers in stock for immediate delivery.

Halstead & Mitchell condensers may be restored to original efficiency through the simple use of a power-driven cleaning tool that restores the copper water-tube surfaces to new condenser value

Combine this CLEANABLE feature with a true tube-within-a-tube counter-flow principle of operation and you have a unit which makes obsolete most old style water-cooled condensers.

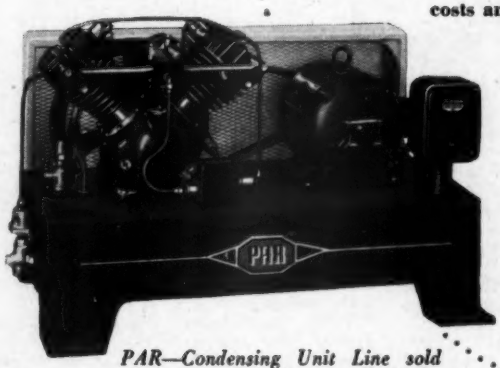
Available from stock in standard sizes 1/2 to 10 H.P

HM Halstead & Mitchell

OFFICES: Bessemer Building, Pittsburgh 22, Pa.

# PAR REFRIGERATION UNITS

are designed and built in a wide range of models and sizes to give you dependable economical refrigeration. Air-cooled and water-cooled . . . close-coupled and heavy duty type . . . and in sizes from 1/6 hp to 5 hp. Regardless of your requirements, there's a Par unit for "tailored" installations that give lower operating costs and longer trouble-free service.



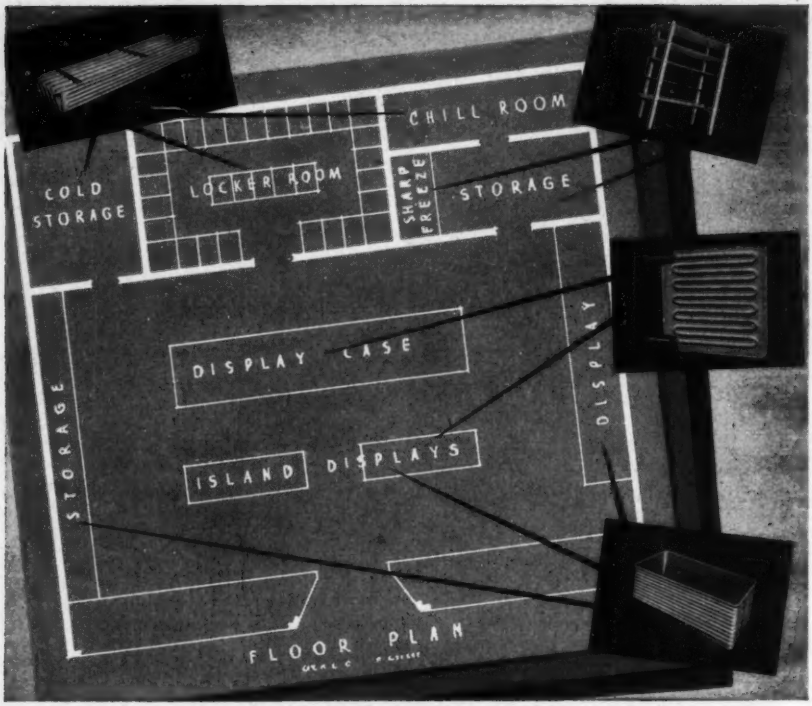

*PAR—Condensing Unit Line sold exclusively through Franchised Refrigeration Equipment Wholesalers!*

*Ask your Par wholesaler about Par or write for illustrated Catalog R-98*

*. . . By Comparison — You'll Buy PAR*

**Lynch Manufacturing Corporation**

*General Offices, Toledo 1 • Factory, Defiance, Ohio, U.S.A.*

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Kold-Hold equipment is designed for efficient, economical refrigeration. It is unequaled for locker plant applications. Constructed simply and rigidly, lightweight Kold-Hold Refrigeration Units have only one wall between the refrigerant and the contacting air. Tubes, pipes and unnecessary refrigeration joints are eliminated. The refrigerant flows through the stamped steel serpentine passages and contacts a maximum surface area creating an exceptionally high rate of heat acceptance and equally fast temperature pull down.

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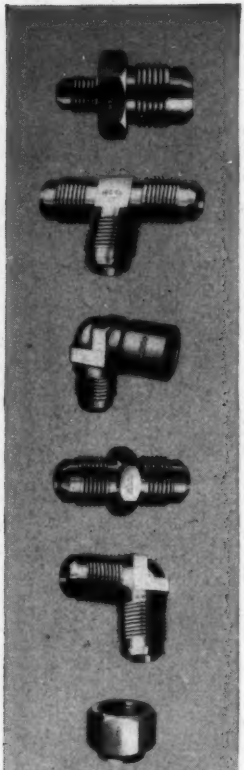
Write for complete data on Kold-Hold Locker Plant refrigeration. Ask for a free copy of the new Kold-Hold Catalog showing the latest equipment in this line.

**KOLD-HOLD**

*Jobbers in Principal Cities*

protects every step of the way

**KOLD-HOLD MANUFACTURING CO.,** 502 E. Hazel St., Lansing 4, Michigan



Mueller Brass Co. refrigeration fittings are manufactured either from forgings or from extruded brass rod. They conform in every respect to S. A. E. Standards with the exception of the bore. These openings are machined to permit a full flow equal to the inside diameters of the tubing used, and consequently are larger in internal area than S. A. E. fittings.

MUELLER
BRASS CO.
PORT HURON,
MICH.

ORDER FROM
YOUR WHOLESALER

# YOUR REFRIGERATION WHOLESALER IS YOUR BUSINESS FRIEND

● The wholesaler has a distinct and important service to perform in the distribution of goods. We believe that through the services he renders, the goods actually reach the ultimate buyer at a lower cost rather than a higher one, and that selling goods direct does not reduce the cost to the eventual consumer. As manufacturers we know that if we sold direct, we would require billing, accounting and shipping forces ten to twenty times greater than what we have at present. Our transportation charges would increase tremendously, our storage space would have to be greatly enlarged. These things and many more would necessarily reflect themselves in the cost of the product.

Our policy for many years has been to distribute our goods on a selective wholesaler plan. Our experience has shown us that this policy is a sound one. It achieves for us a nation-wide distribution at the lowest possible cost. This lower cost naturally benefits not only us but also the wholesaler, service man and contractor.

Our distribution policy will be continued on the same basis as it has been for many years—the selective wholesaler plan. We will sell only sufficient wholesalers in a locality to assure complete coverage of territory and trade. All trade inquiries will be referred to the wholesaler.

**MUELLER BRASS CO.**
PORT HURON, MICHIGAN

# "I like its easy accessibility."

Refrigeration engineers who have examined and watched the performance of the new Mills Direct Drive Compressor tell us—enthusiastically—that it is exceptionally easy to maintain and repair. This is because, as our own engineers believed when they designed it, each assembly and each part are readily accessible.

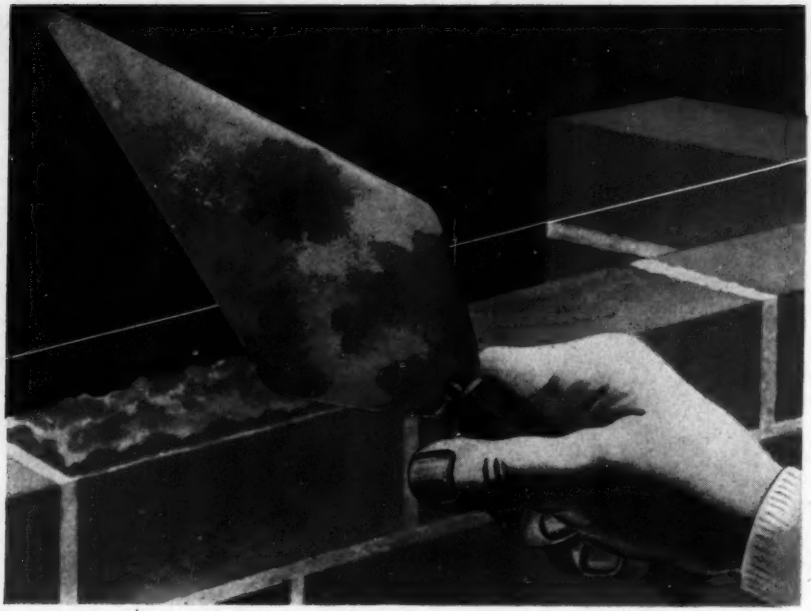
Small and compact though it is, the Direct Drive has all of the service advantages of open type units. No larger than comparably rated hermetic compressors, it has no enclosing hood to make factory repair essential. Instead, it can be put back into operation "on location."

Its light weight, small size, and high standards of efficiency and performance are other factors contributing to its growing acceptance throughout the industry.

**MILLS**
***Direct Drive***
**COMPRESSOR**

**First post-war addition to a distinguished family of air- and water-cooled condensing units**

MILLS INDUSTRIES, INCORPORATED • 4100 FULLERTON AVENUE • CHICAGO 39, ILLINOIS



## WHAT'S BEHIND THE BRICKS AND MORTAR?

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OUR FORTIETH YEAR

We have just moved into a new building. It's a conventional building of bricks and mortar . . . filled with precision machinery . . . staffed by hundreds of skilled workers.

It is also "headquarters" for the finest group of refrigeration engineers in the country . . . the Bush factory representatives. Their knowledge and cooperation have helped us grow during the past forty years . . . have helped make the Bush name stand for soundly built products and alert application of new principles.

Get acquainted with these Bush representatives. They're worth knowing.

*Bush products are sold by leading refrigeration wholesalers everywhere*

**Heat Transfer Products • BUSH MANUFACTURING CO. • Hartford, Conn.**

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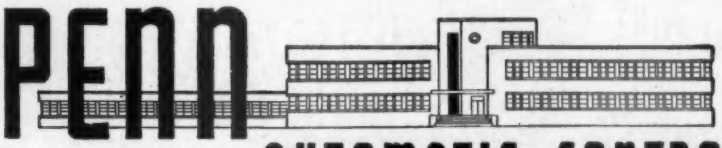
# . . . the PENN Water Valve

Sedimentation, corrosion and rust have no destructive effects on this water valve. New-type design takes care of that! Water flows in *the center section only.* It never makes contact with the range spring and sliding parts. Consequently, there is no premature wear and water valve failure.

In addition, this PENN 246 eliminates sticking seats and water hammer . . . yet is extremely sensitive to changes in refrigerant head pressure. Send for the free Bulletin on these different and better water valves. Built in threaded and flanged styles . . . in many sizes to meet your specific needs. *Penn Electric Switch Co., Goshen, Ind.* Export Division: 13 E. 40th St., New York 16, U.S.A. In Canada: Penn Controls, Ltd., Toronto, Ont.




**AUTOMATIC CONTROLS**

FOR HEATING, REFRIGERATION, AIR CONDITIONING, ENGINES, PUMPS AND AIR COMPRESSORS

# NEW IMPERIAL TORPEDO DRIER

## . . offers 4 important improvements including MICRONIC FILTER

Imperial leads again with an improved drier-filter design providing important advances. They make the Imperial Torpedo more than ever your best weapon in the war on moisture:

1. New micronic filtering element is 3 times finer than ordinary screens . . . has more filtering area for longer operation without cleaning . . . removes foreign matter, prevents passing of tiniest particles of Silica Gel.
2. Two wrench holds make refilling very easy.
3. Large sizes have female flare threads fitted with male unions permitting size interchangeability.
4. Capacities rated in accordance with REMA recommendations.

Has all the other important advantages described at right. Light weight eliminates strains in line in installation. Packed with Silica Gel under controlled atmospheric conditions.

***Also a line of non-refillable driers in sizes up to ¾ hp.***

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**Micronic Filtering Element**

Made of phenolic-resin-impregnated cellulose, polymerized to make it impervious to refrigerants. The refrigerant passing through the filter deposits foreign matter on the outer surfaces. Easily and quickly cleaned.


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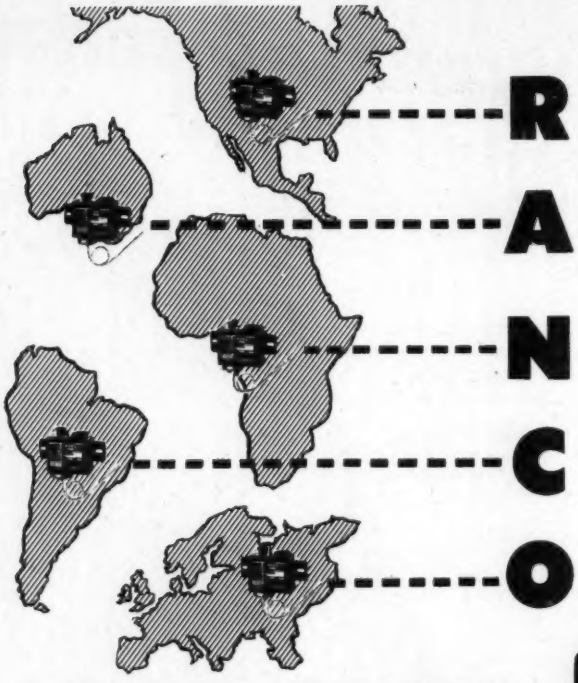
Valves • Filters • Driers • Floats • Charging Lines • Tools for cutting, flaring, bending, coiling, pinch-off, swedging




## THE WORLD'S MOST "TESTED-BY-USE" REFRIGERATION CONTROLS


Ranco Controls, standard of quality in the refrigeration industry, prove the excellence of their design and performance every day in millions of installations throughout the world.

These are a few of the features that give Ranco Controls their accurate, dependable, long-life operations —

- Stainless steel working parts
- Corrosion-defying silver soldered joints
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- KNOB setting of temperature, pressure
- Beryllium copper bellows
- Completely automatic defrosting
- Vermin proof steel cover

Ranco does *not* build an "all-purpose" control. Ranco Controls are engineered for exact or general replacement for every type of commercial or household refrigeration unit.

**THERE IS ALWAYS A CORRECT RANCO CONTROL**

Ranco Type 0-1470 for low temperature control.

See YOUR jobber today — and write for Bulletin 1042 on Commercial Controls.

Ranco Inc.

COLUMBUS, OHIO

# THE REFRIGERATION SERVICE ENGINEER

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**433-435 North Waller Ave.**
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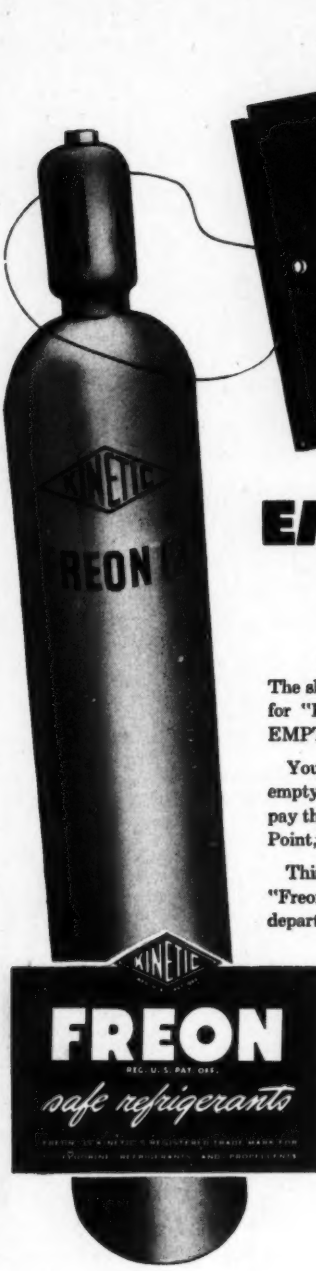



# EMPTY "FREON" CYLINDERS

The shortage of cylinders continues. To meet current demands for "Freon" we *must* make use of every available cylinder. EMPTIES are urgently needed NOW.

You can help. Check *all* cylinders you have on hand. Return empty "Freon" cylinders at once . . . today, if possible. We'll pay the freight. Ship them to: Kinetic Chemicals, Inc., Carney's Point, New Jersey.

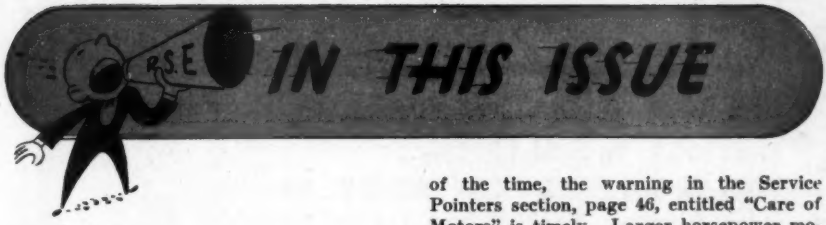
This handy memo may help you to speed return of empty "Freon" cylinders. Please forward it to the proper person or department . . .

TO_____

DEPT._____

We've had an urgent appeal from the "Freon" people to return all empty "Freon" cylinders at once. Check *all* cylinders we have on hand. Arrange to return empty "Freon" cylinders as soon as possible. Ship them freight collect to:

**Kinetic Chemicals, Inc.**
**Carney's Point, New Jersey**




IF WE are going to do a good job of selling, installing and servicing refrigeration we should have a knowledge of the product to be refrigerated because upon this knowledge of the product will depend the accuracy of the design and the success of the operation. Foods represent the great bulk of the products kept under refrigeration, therefore "Things we need to know about Foods" are of first importance. Donald K. Tressler, Consultant, and an authority on the subject begins, on page 31, a lengthy discussion on the factors entering into the spoilage of foods and the conditions under which they can be stored.

A GROWING tendency in some areas to sell refrigeration on a 90 day guarantee period instead of the usual one year, seems ill-advised. Pitfalls in the policy will become increasingly apparent as we approach more normal business conditions. "Guaranteed—One Year or 90 Days," appearing on page 37, points out the inadequacy of 90 day service plans.

A COMPLETE description of the construction, operation and field servicing of "The Hermetic Line of Kelvinator and Leonard Units" begins on page 38 of this issue. Kelvinator is one of the leading four in the production of household refrigerators which makes this article an important addition to your file of information on hermetic units.

THE Question and Answer section, appearing on page 44 this issue, contains a lengthy problem in calculating heat loads in addition to several comments on past questions.

TO THOSE of us who are accustomed to dealing with motors below 1½ hp. most of the time, the warning in the Service Pointers section, page 46, entitled "Care of Motors" is timely. Larger horsepower motors require more care before starting than the small motors.

IF ANYONE should suggest to you that you display your electric refrigerating equipment in your local bank, we bet you would say "impossible!"—because, you would say, the bank would not agree to the disruption of its traditional decorum. Yet that is exactly what is being done by one firm in the state of New York. It sounds like a good idea. Read about it on page 48.

IN HIS second article, "Take the Guess Out of Estimating" by Donald F. Daly on page 49, he begins the difficult problem of estimating the cost of installing a medium size commercial system, covering the method of sketching the layout and figuring up the material list and a reminder of the incidentals. All of this is preliminary to the final job of determining the labor cost which will follow.

WE HAVE often wondered about the problems of the wholesalers' men and when we read "Life of a Counterman" on page 58, it "hit the spot." Perhaps you will enjoy it, too.

## COVER

OUR front cover this month shows freshly picked strawberries being prepared for freezing and eventual shipment to your table so that you may enjoy the delicacy of fresh strawberries and cream many months after the season has ended. The strawberries picked in these flat boxes are washed and sorted prior to being frozen, then packed in individual containers ready for serving. Donald K. Tressler in his article "What We Need to Know About Foods," appearing elsewhere in this issue, explains the need of freezing such food products.

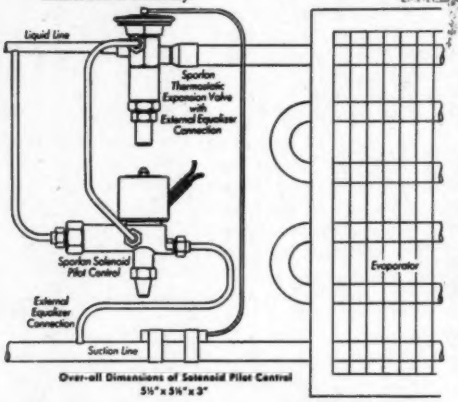
# Save Money 3 Ways

by using the

## SPORLAN SOLENOID PILOT CONTROL

*for Positive Shut-Off of Liquid Lines!*

1. A Sporlan Solenoid Pilot Control costs *less* than a large capacity Solenoid Valve.
2. The Sporlan Solenoid Pilot Control eliminates stocking a variety of large Solenoid Valves. The Sporlan Solenoid Pilot Control is made in only one size and can be used on any capacity job, no matter how big.
3. It's easier and cheaper to install a Sporlan Solenoid Pilot Control than a large Solenoid Valve. The Solenoid Pilot Control is installed in the external equalizer line of a Thermostatic Expansion Valve and only one additional ¼" connection is necessary.




Over-all Dimensions of Solenoid Pilot Control 5½" x 3⅝" x 3"

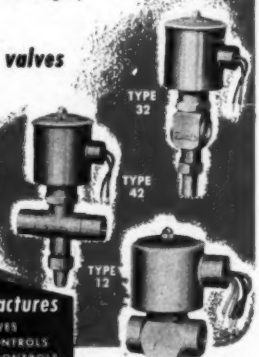
## How the Sporlan Solenoid Pilot Control Works...

A very small amount of liquid refrigerant is bled from the liquid line through a fine mesh strainer and capillary tube to the equalizer connection. When the Solenoid Pilot Valve is open, the small leak is completely vented to the low side, allowing the true suction pressure to influence the Expansion Valve diaphragm in the usual manner and allowing the Expansion Valve to operate normally at full evaporator capacity. When the Solenoid Pilot Valve closes, liquid pressure builds up under the Expansion Valve diaphragm, overcoming the effect of the bulb pressure and the Expansion Valve spring closes the Expansion Valve tightly

***Any number and any size of thermostatic expansion valves may be connected to one pilot control,*** thus simultaneously controlling the action of all valves on one evaporator or entire plant. The Solenoid Pilot Control is used in exactly the same manner as a liquid line Solenoid Valve. Its coil is energized either through a thermostat, pressure switch or manual control or by connection across the compressor motor or starter.

### *Two wire control is used...*

The expansion valves will be open when the pilot coil is energized and closed when de-energized in exactly the same manner as the conventional solenoid valve. When de-energized the leak from high to low side also stops. The pilot control may be applied to existing jobs merely by connecting with ¼" copper tubing and completing electrical connections.

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SOLENOID VALVES
SOLENOID PILOT CONTROLS
MODULATING PILOT CONTROLS
REFRIGERANT DISTRIBUTORS
STRAINERS CATCH-ALLS
*and the only*
THERMOSTATIC EXPANSION VALVES
*with* SELECTIVE CHARGES

For smaller installations and for ammonia applications Sporlan offers a complete line of conventional Solenoid Valves

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*Always specify Sporlan when ordering from your wholesaler and get Peak Performance on All installations*


# Things we need to know
# *About Foods*

By DONALD K. TRESSLER*

ANYONE dealing with refrigeration machines should know about foods, therefore a discussion of how and why foods change and how refrigeration affects these changes and why refrigeration preserves foods should be helpful.

We are concerned primarily with perishable foods. Of course, in a way all foods are perishable, but some are far more perishable than others; I refer particularly to fruits and vegetables, meats, poultry, dairy products, fish and shellfish. There are many, many others that are more or less imperishable. As a matter of fact, almost any food can be kept better under refrigeration than at ordinary room temperatures and one of the interesting things is that as refrigeration becomes more and more commonplace, more and more people eat more and more foods which have been kept under refrigeration. In other words, things we once thought were more or less imperishable are now kept under refrigeration.

## Four Causes of Deterioration

First, I wish to point out that there are four primary causes of deterioration. We sometimes call it spoilage, but you may be confused by the term spoilage because the average person thinks of spoilage as something that occurs when micro-organisms attack the food. Foods not only deteriorate when attacked by micro-organisms but they deteriorate from other causes. There are certain enzymes which occur in food which, as the product is being grown, enable the product to ripen and to mature; but once the product has been harvested it begins to be destroyed by these very enzymes which made it, so to speak.

Then, there are chemical actions. Those are complex and apparently a little beyond the understanding of the average person, but I am sure all of you are familiar with the fact that butter turns rancid; if left at ordinary temperatures it may turn rancid very quickly. That development of rancidity is in a way both an enzymic action and a chemical action, but it is primarily a chemical action. Of course, it is true that certain enzymes speed up the development of rancidity in fats. In a way, in practically all perishable foods it is difficult to say this deterioration is caused by chemical action, and that one is caused by enzymic action. As a matter of fact, both actions occur simultaneously and both cause deterioration. The enzymes accelerate the chemical action, so it is often difficult to distinguish between the two.

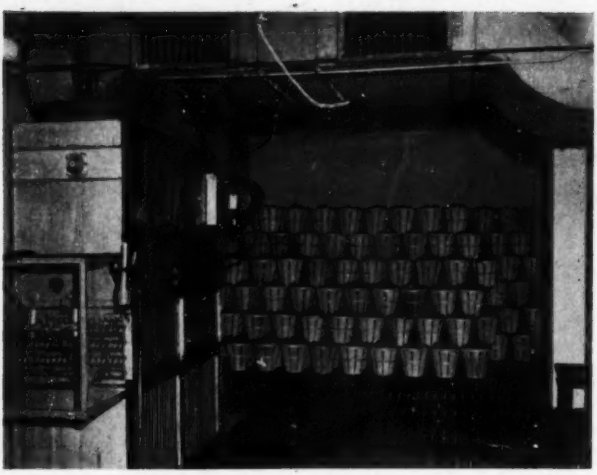
Then, there is deterioration caused by desiccation. Desiccation is the easiest type of deterioration to explain and the one that I am sure all of you are familiar with and understand pretty well. Desiccation is more or less of a scientific term for drying.

Another term that you hear and have heard a great deal of in recent years is dehydration. Well, in a way the dehydration of foods is merely carrying on this desiccation or drying under controlled conditions until the food contains little moisture.

An example of deterioration caused by desiccation or drying, is the wilting of vegetables such as celery and lettuce. In a way, these are not simple drying or desiccation processes; there are certain enzymic changes that occur simultaneously. You know that if a case of celery is left in a dry atmosphere, especially if it is a little warm, the celery soon becomes flabby and once it becomes flabby it is nearly worthless. It is possible to make it a little more crisp by putting it in water but even then you will never bring that celery back to its original quality.

Another example with which you are familiar and here again we have one

* Consultant, Wesfort, Conn. Paper delivered to RSES annual convention in Cleveland.



**Fruits and vegetables need space to breathe and should be arranged in containers that permit air circulation. Humidity requirements are generally high to prevent drying of the product.**

that is not solely a question of drying, is the staling of bread, cake and baked goods in general. Desiccation is a very important factor in staling and if cakes and baked goods do dry out, staling occurs more rapidly; but there are other factors, that even scientists who are working in that field do not understand too well, occurring along with these desiccating actions during the staling of baked goods.

Many other products deteriorate because of drying but those I have listed are examples.

Now, to come back to the growth of micro-organisms. There are three general classes of micro-organisms that cause deterioration of foods (bacteria, yeasts and molds).

To the public, spoilage usually means the growth of micro-organisms. But to the chemist *spoilage is deterioration which has gone to the point where the food is no longer of first class quality.*

All of you have seen molds and know what molds do. In some instances, the growth of molds is beneficial. Certain types of cheese need mold to develop flavor and those changes caused by the molding are not necessarily objectionable. But when certain other foods mold, for example, meat or fruit of vegetables, the product soon becomes worthless. Molds grow primarily on the surface. They need air for their growth. If you can shut out air, ordinarily you can stop molding. Mold is objectionable from the standpoint of the appearance of the product and in many instances it develops an off-flavor and usually softens the product as well, and for those reasons causes the product to deteriorate.

Most of you are familiar with yeasts and know yeasts are necessary to produce certain foods, as in the fermentation of bread dough in the making of bread, in which you have the production of carbon dioxide and alcohol. I suppose a lot of W.C.T.U. members would be shocked to know whenever they make bread they are making alcohol and when they are eating bread they are eating alcohol. However, the primary purpose is not the production of alcohol; the amount of alcohol in bread is not sufficient to make one intoxicated. So the eating of bread is all right even from the point of view of the W.C.T.U. When juices ferment, large percentages of alcohol may be produced, as is the case in the change of apple juice to cider or hard cider. The sugar is changed by the action of the yeast into alcohol and carbon dioxide. All sorts of fruit juices may be fermented to make wines. If grape juice is fermented the product is grape wine, but other fruit juices give other types of wine. These are all examples of desirable fermentations but we have many fermentations that are undesirable. For example, if you bruise fruits, or hold them at too high a temperature, they may become infected with yeasts. As a result the whole fruit ferments and spoils. I am sure all of you have seen whole raspberries which have fermented and taken on the flavor of new wine; and that in a whole fruit is undesirable.

Yeasts cause undesirable actions in many kinds of perishable foods. Whenever there are carbohydrates, that is, sugars and starches, yeasts will grow if the moisture content is high enough and if the temperature is sufficiently high. The yeast will grow and form alcohol and cause deterioration.

Most persons think of bacteria as something that cause diseases. That is true of one type of bacteria, the pathogenic organisms, but of all the bacteria we have in the world, probably not over one ten-

thousandth of one per cent are disease-producing organisms. Most bacteria are beneficial and needed in the world for various reasons.

There are two general types of bacteria so far as food spoilage is concerned. One is the putrefactive type of bacteria and as a rule, that type of bacteria is undesirable. The other type causes a souring or fermentation; in some instances the actions of these bacteria in foods are desirable. In other instances, they are undesirable. As an example, consider fermentation in the production of sauerkraut. Because of the growth of lactic-acid forming bacteria, kraut develops a desirable flavor. If it weren't for the growth of these desirable micro-organisms, other micro-organisms would step in and cause the putrefaction of the cabbage and the product would be undesirable and unsuitable for use as a food. Probably all of you have seen cabbage that has been fermented at too high a temperature, above 80 F. we will say, that has putrefied and developed a foul odor and does not taste or smell at all like kraut.

The souring type of bacteria, the lactic-acid formers, grow in dairy products; when the acidity becomes relatively high, we say the milk is sour. Such actions do not cause the development of any poisons. Some people like sour milk and some, as you know, use sour milk in many types of cookery. Sour cream is also commonly used. Those are examples of a change in a product which, in a way, is deterioration and yet which is useful.

However, there are putrefactive changes, such as in meats and fish, particularly, and most protein foods except dairy products, that may be not only undesirable but that may even cause the development of poisons. Most of you know that vegetables are only very slightly acid and can be considered neutral. If improperly processed, canned vegetables may turn putrid and in that case there may be the development of very toxic micro-organisms. Furthermore, there may be formation of chemical products which in themselves are very poisonous, as, for example, the development of the botulinus toxin, one of the most powerful poisons.

In review, let us then say that there are four principal causes of the deterioration of perishable foods: (1) The growth of micro-organisms, chiefly bacteria, yeasts and molds; (2) The action of enzymes which occur naturally in foods; (3) Chemical actions, such as oxidation and hydrolysis; and (4) Desiccation. The last causes deterioration of fruits, vegetables, baked goods, etc., but does not affect all foods.

Now, to come down to how refrigeration preserves food. If you have a little understanding of the reasons why foods deteriorate, we will now see how to retard these actions.

Cool storage, or refrigerated storage at temperatures above 32 F., materially reduces the rate at which foods deteriorate from all four of these causes. Bacteria, yeasts and molds grow much less rapidly near 32 F. than at ordinary room temperatures. Meats which would spoil from bacterial action in a single day at 80 F., will keep for a month at 31 F. Most enzymes are still active at 32 F., but the rate at which they act is far below that at 70 F. Similarly, oxidation, hydrolysis and other chemical changes occur relatively slowly at cool storage temperatures. Water evaporates less rapidly at low than at high temperatures and consequently the rate of spoilage of unpackaged food because of desiccation is markedly reduced by refrigeration.

Storage at temperatures below freezing is usually even more effective in reducing the rate of deterioration of foods. However, freezing itself causes marked changes in many foods, and is the accidental cause of spoilage of some fresh foods, such as fruits and vegetables.

If foods are refrigerated at temperatures below 15 F. (in cold storage), spoilage by micro-organisms is entirely prevented, since growth of yeasts and molds does not occur, and bacteria multiply so slowly that foods are not af-

The modern keeper of the farm home freezes the future family meal.

fected. Much lower temperatures are required to prevent deterioration of unpackaged foods by desiccation or of many foods by enzymic and chemical actions. To stop chemical and enzymic changes the temperature must be reduced to —40 F. or even lower. Desiccation and oxidation are best prevented by proper packaging of the foods prior to freezing. In the case of vegetables and certain other foods, enzymic action is stopped by heating (blanching) prior to freezing.

In general, it can be said that refrigeration at the temperatures of commercial cold storage does not stop the deterioration of perishable foods; it merely slows it up so that the products can be held for a few weeks or months and can be marketed more advantageously or processed at a later date. As a rule the lower the temperature, the slower the rate of deterioration. However, there are many exceptions to this statement, some of which will be mentioned later.

## Cool Storage

In a brief discussion such as this, it will be impossible to consider in detail the storage of all kinds of perishable foods. However, storage of the principal classes of foods will be discussed and the general principles of food refrigeration elaborated.

Fresh meats are highly perishable and therefore must be cooled immediately after slaughter and kept just above the freezing point unit used. Offal meats (liver, kidney, heart, etc.) spoil very quickly even when kept at 32 F. and so must be frozen if they are to be held for longer than a few days. Veal is highly perishable and cannot be stored long even when kept just above freezing. Pork, lamb and mutton do not spoil so quickly but still are difficult to keep for longer than two weeks. Beef keeps somewhat better, but even so, storage for six weeks is about the limit.

During chilling of meat after slaughter, air should be circulated in the refrigerated room in order to obtain a rapid cooling of the meat. High humidity (90% or above) should be maintained in order to prevent excessive desiccation (chilling shrink). After the temperature of the meat has been reduced to about 32 F. it should be moved into a storage maintained at a uniform temperature of 31 to 33 F. If the relative humidity is much below 90%, excessive desiccation and loss of "bloom" will occur. If the relative humidity is above 90%, the meat may mold and slime may develop. Air movement helps to prevent molding but should be gentle, otherwise excessive desiccation will occur.

Most service engineers understand what relative humidity is but for the benefit of those that do not, I will simply state that when air is saturated with moisture the relative humidity is said to be 100 per cent. When there is no moisture in the air, the relative humidity is zero per cent. Of course, that last condition practically never exists. If you have half the amount of moisture in the air, that is when the air is one-half saturated, we have a condition known as 50 per cent relative humidity. The higher the relative humidity, the slower the rate of desiccation or drying.

In general, where there is a wide differential between the temperature of the refrigerator or freezer and the temperature of the refrigerant, there is a relatively low humidity in the refrigerator or freezer. When the temperature of the refrigerant is substantially the same as the temperature of the air in the refrigerator or freezer, you have in that refrigerator or freezer substantially 100 per cent relative humidity. Of course, that condition again almost never exists.

Beef, and sometimes mutton, is usually held at 37 F. to 39 F. for a period varying from a few days to six weeks in order to age it. Aging tenders meat somewhat and changes its flavor. During long aging some mold grows on the meat, but is trimmed off before the meat is used.

## Preserved Meats

Bacon, ham, smoked sausage, salted pork and corned beef are much less perishable than the corresponding products before curing, nevertheless, they should be held under refrigeration if they are to be held longer than a few days. Although these products will keep for weeks at 40 F., a temperature near 32 F. is preferable if the products are to be kept free from rancidity.

## Fresh Fish

Fresh fish is much more perishable than meat. Fish is refrigerated to permit transportation and sale, but should not be put into storage even for a few days, since it deteriorates too rapidly. As a rule fish is packed in crushed ice or "Flak-Ice." This helps to hold the product at 32 F. at all times from capture to use, during transport, handling and display.

## Preserved Fish

Salted and smoked fish are less perishable than fresh fish. Salting and smoking are fairly effective in retarding the growth of micro-organisms on fish but

## Table I—Storage Properties of Foods*

| Commodity | Storage temp., ° F. | Relative humidity, % | Approx. storage life | Water content, % | Av. freezing point, ° F. |
|---|---|---|---|---|---|
| Apples | 31–32 | 85–88 | | 84.1 | 28.4 |
| Artichokes | | | | | |
| Globe | | | | 83.7 | 29.1 |
| Jerusalem | 31–32 | 90–95 | 2– 5 months | 79.5 | 27.5 |
| Asparagus | 32 | 85–90 | 3– 4 weeks | 93.0 | 29.8 |
| Avocados | 40–55 | 85–90 | | .. | 27.2 |
| Bananas | b | b | | 74.8 | .. |
| Beans | | | | | |
| Green or snap | 32–40 | 85–90 | 3– 4 weeks | 88.9 | 29.7 |
| Lima | 32–40 | 85–90 | 3– 4 weeks | 66.5 | 30.1 |
| Beets | | | | | |
| Topped | 32–35 | 90–95 | 3– 6 months | 87.6 | 26.9 |
| Bunch | 32 | 85–90 | 7–10 days | .. | .. |
| Blackberries | 31–32 | 80–85 | 7–10 days | 85.3 | 28.9 |
| Broccoli, Ital. | 32 | 85–90 | 10–12 days | 89.9 | 29.2 |
| Cabbage | 32 | 90–95 | 3– 4 months | 92.4 | 31.2 |
| Carrots | | | | | |
| Topped | 32 | 95–98 | 2– 4 months | 88.2 | 29.6 |
| Bunch | 32 | 90–95 | 7–10 days | | |
| Cauliflower | 32 | 85–90 | 2– 3 weeks | 91.7 | 30.1 |
| Celery | 31–32 | 95–98 | 2– 4 months | 93.7 | 29.7 |
| Cherries | 31–32 | 80–85 | 10–14 days | 83.0 | .. |
| Coconuts | 32–35 | 80–85 | 1– 2 months | milk, 95.2<br>flesh, 46.3 | 30.4<br>25.5 |
| Corn, sweet | 31–32 | 85–90 | | 73.9 | 29.0 |
| Cranberries | 36–40 | 90–95 | 1– 3 months | 87.4 | 27.3 |
| Cucumbers | 45–50 | 85–90 | 6– 8 days | 96.1 | 30.5 |
| Dried fruits | 32–50 | 70–75 | 1– 2 years | .. | .. |
| Eggplant | 45–50 | 85–90 | 10 days | 92.7 | 30.4 |
| Endive | 32 | 90–95 | 2– 3 weeks | 93.3 | 30.9 |
| Garlic | 32 | 70–75 | 5– 6 months | 74.2 | 25.4 |
| Grapefruit | | 85–90 | 8–10 weeks | 88.8 | 28.4 |
| Grapes | | | | | |
| European type | 31–32 | 80–85 | 4– 6 months | 81.6 | 24.9 |
| American type | 31–32 | 80–85 | 8–14 weeks | 81.9 | 27.5 |
| Horse-radish | 32 | 90–95 | 4– 6 months | 73.4 | 26.4 |
| Leeks | 32 | 85–90 | 1– 3 months | 88.2 | 29.2 |
| Lemons | 55–58 | 80–85 | 2 weeks–4 months | 89.3 | 28.1 |
| Lettuce | 32 | 90–95 | 2– 3 weeks | 94.8 | 31.2 |
| Limes | 45–48 | 85–90 | 7– 8 weeks | .. | 29.3 |
| Melons | | | | | |
| Watermelons | 35–40 | 80–85 | 1– 3 weeks | 92.1 | 28.8 |
| Muskmelons | 50–55 | 80–85 | 1– 3 weeks | 92.8 | 28.5 |
| Honeydew—<br>Honey ball | 40–50 | 80–85 | 3– 4 weeks | .. | 28.8 |
| Casaba and<br>Persian | 35–40 | 80–85 | 4– 6 weeks | .. | .. |
| Mushrooms, cultiv. | 32–35 | 80–85 | 2– 3 days | .. | 30.2 |
| Nuts | 32–70 | 65–70 | 8–12 months | pecans, 3.2<br>Eng. walnuts, 2.5 | b |
| Onions and onion sets | 32 | 70–75 | 5– 6 months | 87.5 | 30.1 |
| Oranges | 34 | 80–85 | 1– 2 months | 87.2 | .. |
| Parsnips | 32–34 | 90–95 | 2– 4 months | 78.6 | 28.9 |
| Peaches | 31–32 | 85–90 | 2– 4 weeks | 86.9 | 29.4 |
| Pears | 30–32 | 85–90 | | 82.7 | b |
| Peas, green | 32 | 85–90 | 1– 3 weeks | 74.3 | 30.0 |
| Peppers | | | | | |
| Sweet | 32 | 85–90 | 4– 6 weeks | 92.4 | 30.1 |
| Chili, dry | 32–50 | 70–75 | 5– 9 months | | .. |
| Pineapple | | | | | |
| Mature green | 50–60 | 85–90 | 3– 4 weeks | .. | 29.1 |
| Ripe | 40–45 | 85–90 | 2– 4 weeks | .. | 29.9 |
| Plums | 31–32 | 85–90 | 1– 2 weeks | 85.7 | 28.0 |
| Potatoes | 36–60 | 85–90 | | 77.8 | 28.9 |
| Pumpkins | 55–60 | 70–75 | 2– 6 months | 90.5 | 30.2 |
| Quinces | 31–32 | 80–85 | 3– 4 months | 85.3 | 28.1 |
| Raspberries | | | | | |
| Black | 31–32 | 80–85 | 7–10 days | 80.7 | 28.8 |
| Red | 31–32 | 80–85 | 7–10 days | 83.4 | 30.4 |

**Table I Continued—Storage Properties of Foods[a]**

| Commodity | Storage temp., ° F. | Relative humidity, % | Approx. storage life | Water content, % | Av. freezing point, ° F. |
|---|---|---|---|---|---|
| Rhubarb | 32 | 90–95 | 2– 3 weeks | 94.9 | 28.4 |
| Squash, winter | 55–60 | 70–75 | 2– 6 months | 90.4 | 29.3 |
| Strawberries | 31–32 | 80–85 | 7–10 days | 90.0 | 29.9 |
| Sweet potatoes | 50–55 | 80–90 | 4– 6 months | 68.5 | 28.4 |
| Tomatoes | | | | | |
| Ripe | 50–55 | 80–85 | 7–10 days | 94.1 | 30.4 |
| Mature green | 55–70 | 80–85 | 1– 6 weeks | 94.7 | 30.4 |
| Turnips (including rutabagas) | 32 | 95–98 | 2– 4 months | 90.9 | 30.5 |

[a]From D. H. Rose, R. C. Wright, and T. M. Whiteman, U. S. Dept. Agr., Circ. 278 (1933).

[b]For bananas: green, flesh—30.2° F., peel—29.8°; ripe, flesh—26.0°, peel—29.4°. For cherries: eastern, sour—28.0°, sweet—24.7°; California, sweet—24.2°. For oranges: flesh—28.0°, peel—27.4°. For pears: Bartlett—28.5°, Winter Nelis—27.3°, Anjou—26.9°. For Persian (English) walnuts—20.0°, pecans—19.6°, and chestnuts (Italian)—23.8°.

do not stop the oxidation of the highly unsaturated fats. If preserved fish are to be held for longer than two or three weeks, they should be kept at a low temperature, preferably 10 or 15 F.

Smoked herring and salted cod, for example, should be held at 15 F. or lower if they are to be held during long periods of time. Of course, they can be held satisfactorily at 32 F. for a month or two.

## Fruits and Vegetables

Fresh fruits and vegetables differ from the products I have been discussing, since they are still alive. Many people do not understand that. It wasn't until I went into a study of horticulture that I really understood it. They respire just as you and I do. That is, they take up oxygen and give off carbon dioxide; and just as we would be smothered by putting us in a closed space, so fruits and vegetables will be smothered if they are tightly packed in a closed space where there is no chance for change of air.

I know many packers of food make the mistake of tightly stacking large quantities of corn on the cob or green beans. These products, because of respiration, will actually heat themselves and may deteriorate and spoil in a single night. Such produce must be spread out so it can breathe and the heat that is generated will be dissipated; otherwise, it will spoil.

In general, the best temperature for most fresh fruits and vegetables is 32 F., but there are many exceptions. For example, if you hold potatoes at 32 F., they will grow too sweet because at 32 F. this respiration goes on too slowly and you have a build-up of the sugar content of the potato. The best temperature for potatoes is 40 F.

Table I by Rose, Wright and Whiteman gives the optimum temperatures as worked out by the United States Bureau of Plant Industry for holding all fruits and vegetables. If you are interested in further information you should get the publications of the United States Bureau of Plant Industry. In general, to hold fruits and vegetables for longer periods of time than that shown in the table, they should be stored under relatively high humidity. That is, the air should be nearly saturated with moisture. If it is saturated or over 90% relative humidity, you are likely to get molding. If the humidity is around 90 per cent or lower, you are not so likely to have molding at temperatures of 32 F.

Most apples keep best at 32 F. but a few varieties should be held at somewhat higher temperatures. In general, relatively high humidities should be maintained in rooms in which fruits and vegetables are stored, otherwise a considerable loss in weight will occur, and there will be danger of wilting. Special precautions should be taken in storing apples, bananas, grapefruit, grapes, lemons, melons, celery, cucumbers, eggplant, sweet potatoes, onions, pears, potatoes, pumpkins, squash and tomatoes. Much valuable information concerning cool storage of fresh fruits and vegetables is presented in the Refrigerating Data Book of the American Society of Refrigerating Engineers and in the publications of the U. S. Bureau of Plant Industry.

Dried and dehydrated fruits and vegetables retain their quality far better if held under refrigeration. For this reason considerable quantities of dried and dehydrated fruits are refrigerated. The lower the temperature and the lower the humidity the better they will keep.

The same holds true for vegetables. Unfortunately, most people think dried vegetables are also imperishable but nothing is further from the truth. If de-

*(Continued on page 80)*

# *Guaranteed–*

## One Year or 90 Days?

DURING the war and post-war years, a trend developed among a few isolated individuals or groups toward the rendering of 90-day free service on refrigeration equipment sold by them, while manufacturers generally adhered to the standard one-year warranty on parts.

When most sales are made for cash, as they have been in recent years, a 90-day service plan for selling refrigeration equipment may be satisfactory to the distributor, and arbitrarily accepted by the purchaser, because his desire for equipment far outweighed the normal cautions usually in evidence when a purchaser buys equipment on the installment plan.

In the past few years, buyers usually asked two questions—How Much? When can you deliver it? Even though the distributor operating on the 90-day free service plan may be faced with an occasional problem of rendering free service after the 90-day period in order to hold the goodwill of his customer, it is a matter that the distributor can handle for himself without the amount involved, in such policy free service adjustments, being a serious factor.

### Monthly Payments May Lag

An entirely different question, however, comes up with respect to installment sales of equipment involving refrigeration. The danger in only providing for 90-day service in the event of a time sale is obvious—the customer's down payment plus two or three monthly payments does not provide a sufficient cushion of customer payments to permit repossession of the equipment without substantial losses to the distributor, and where the customer refuses to make payments because of service and the distributor is unable to collect for such service for which he is not charged under the 90-day plan, the dealer is then literally forced to perform such service without compensation or have the installment paper become unsatisfactory due to lack of payments and the distributor be required to make repurchase of the paper in full, repossess the equipment, and have a dissatisfied customer as well.

As there is every indication at the present time of a substantial increase in the amount of time sales and of some slowing up on the part of buyers on a cash basis in meeting their payments, and a tendency on the part of distributors to become less and less liquid due to larger inventories and larger receivables, it is vital from the standpoint of the distributor that he protect himself with respect to his service liabilities on installment paper at the time initial sale is made when the customer resistance is at a minimum.

### Easy to Change Plan

It should be an easy matter for the individual distributor who adopted the 90-day free service plan to start immediately to sell refrigeration equipment on a one-year installation and service plan, by including the cost for installation and service in the sale price and selling it as you do all the other factors entering into the cost of the sale.

You may ask—how can the individual distributor who may have entered into an agreement with a group of distributors to sell refrigeration equipment on the 90-day free-service basis protect himself, without violating the group agreement?

What would be your decision or reaction today if a purchaser wanted to purchase his refrigeration equipment on the basis of installation and one-year service? We have asked this question of some distributors and the answer was—they would sell the equipment installed and serviced for one year and show the installation and service price as a separate item on the contract. Each of the distributors questioned stated that such selling procedure would not violate their agreement with their local group.

### Sell Service with Equipment

When you sell refrigeration equipment installed and serviced for one year, and include the cost of installation and service in the selling price—you are not giving free service, you are selling installation and service; and the sale of one-year's service coincides with the manufacturer's one-year Warranty that is usually included with every piece of equipment when shipped from the factory.

Now is the time to start protecting yourselves against losses on installment sales.

# *The Hermetic*

# Kelvinator and

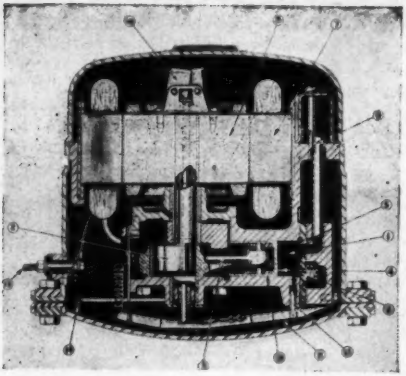


Fig. 1—Cross sectional view of 1938 sealed compressing unit in which (1) is the compressor cylinder; (2) compressor eccentric; (3) connecting rod; (4) compressor piston; (5) suction valve; (6) discharge valve; (7) motor stator; (8) rotor; (9) suction intake; (10) unloader mechanism; (11) unloader valve arm; (12) unloader valve needle; (13) equalizer saddle; (14) discharge tube; (15) motor terminal.

AFTER many years of building conventional reciprocating compressors, Kelvinator and Leonard engineers developed a hermetically sealed compressor using the same general design principles that had been proven by years of use in open type compressors. The early models differed from succeeding years in that the motor and compressor were sealed in the dome-like container with a bolted flange and bottom plate, while later models were welded. The early hermetic models included an unloading device and high side float, while later models eliminated the unloader and utilized a capillary tube. The following describes each year's models and the changes made. A complete list of sealed models produced from 1938 to 1946 is contained in the accompanying oil and refrigerant tables.

## 1938 Models

In principle the sealed unit consists of a simple single cylinder compressor, the cylinder (1) Fig. 1, placed horizontally, with eccentric (2), connecting rod (3), piston (4), suction valve (5) and discharge valve (6). There is nothing new in all this.

The cylinder is cast integral with the main body casting into which the stator (7) is pressed. This assembly in turn, is pressed into a steel dome which is closed at the bottom by means of a steel cover. This method of assembly gives excellent thermal conductivity from the motor stator (7) to the outside of the sealed dome over which cool air is circulated. Dissipation of motor heat by metallic contact, insures a relatively low motor temperature.

The compressor shaft is vertical, the rotor (8) being mounted above the compressor where, for many reasons, it should be placed. This construction enables the compressor to operate under oil with all the resulting benefits. To mention two—a simple but most effective lubricating system and most effective cooling of the compressor. The suction intake (9) is placed so that oil separation is assured under all conditions and oil slugging is entirely eliminated. The motor terminals are under oil as an additional precaution against leaks.

The piston and cylinder wall are hand-lapped to a .0003" tolerance. All pistons are fitted by selective assembly. Each piston and rod assembly is hand-tested to the compressed cylinder. A new method of piston and rod assembly has been developed. The connecting rod is the best grade of bearing-bronze. The bearing surfaces are diamond bored to the same .0003" tolerance to which all parts are held. Instead of the conventional piston pin, the 1938 pin is assembled to the rod and then inserted in the piston against an equalizer saddle. A spring holds it in place and makes this an extremely quiet self-aligning assembly.

The valve plate, discharge and suction valves are of conventional design.

All compressor parts are lubricated by pressure; the most positive manner of lubrication. Oil is actually pumped or forced to all bearing surfaces.

The uniqueness of this unit is the unusual assembly of its simple parts, the positive lubricating system, the effective cooling, the method of oil separation, the immersion in oil of moving parts and of the sealing members. A forced convection condenser with a separate motor driven fan is used on the 1938 models.

# *Line of* Leonard Units

The operating cycle of this unit varies but little from past Kelvinator and Leonard equipment. Following through the operating cycle, Fig. 3, you will note that a capillary is placed between the high-side float and the cooling unit at the cooling unit. This capillary has two purposes. In the first place, with the high-side float mounted on the condensing unit, it is necessary to maintain the temperature of the liquid line from the high-side float to the cooling unit above dew-point to prevent sweating. The pressure drop through the capillary is great enough to prevent sweating in the liquid line. This capillary also prevents over-loading of the motor during the first pull down and during the pull down after defrosting when the back pressure is high.

Under conditions of high back pressure and heavy load, the amount of refrigerant which the compressor would pump per hour would normally be sufficient to cause over-heating of the motor. The pressure drop through a restriction, increases with velocity. Under extreme load conditions the capillary will not pass the amount of refrigerant which the compressor is capable of pumping. There is a tendency then to pump down the low-side and increase the amount of refrigerant in the high-side until the cooling unit has begun to chill and the back pressure is reduced. Such a feature is very important in a sealed system as it prevents damaged motor windings. Under normal operating conditions this capillary with heat exchanger increases efficiency 20 to 25%. The only difference that can be noted is a slightly longer time necessary for the initial pump down, and this only under very extreme conditions. You will note that with this exception, the cycle of operation is identical with previous Kelvinator and Leonard models.

## Electrical Service

The motor used on the sealed reciprocator compressor is of the split phase start induction run type. The use of this type motor

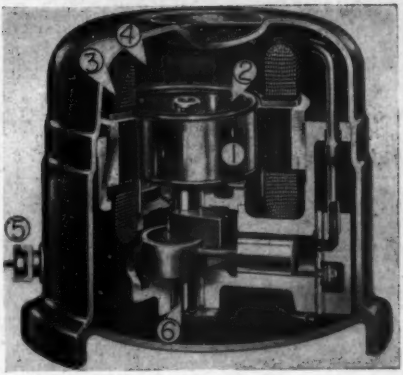



Fig. 2—Cross sectional view of late model compressing unit.

is made possible by unloading the compressor on the start, reducing the required starting torque. When running, this motor is a single phase induction motor and has better load characteristics than any motor used on previous models.

Single phase induction motors are not self-starting. A common method of starting single phase induction motors is by introducing a second out of phase magnetic field in the stator during the starting period. In this motor a starting winding is wound on the stator, shifted in position from the main winding. By means of a relay this starting winding is cut into the circuit when the motor circuit is closed and is cut off the circuit when a predetermined condition is reached.

Fig. 4 shows a cutaway of the starting relay and thermal overload. Fig. 5 is a complete circuit diagram. Fig. 6 shows the starting relay wiring diagram and terminal connections. Referring to Fig. 5, the starting of the compressor motor is accomplished as follows: When the cooling unit reaches a predetermined temperature, the temperature control switch closes. The starting relay coil is in series with the main motor winding. The main winding current therefore passes through the starting relay coil. The initial rush of current through the main winding energizes the starting relay coil and pulls up the starting relay armature, closing the starting winding contacts. (The copper damping ring shown in Fig. 4 prevents hard hitting and chattering of these contacts.)

The current through the starting winding introduces a second out of phase magnetic

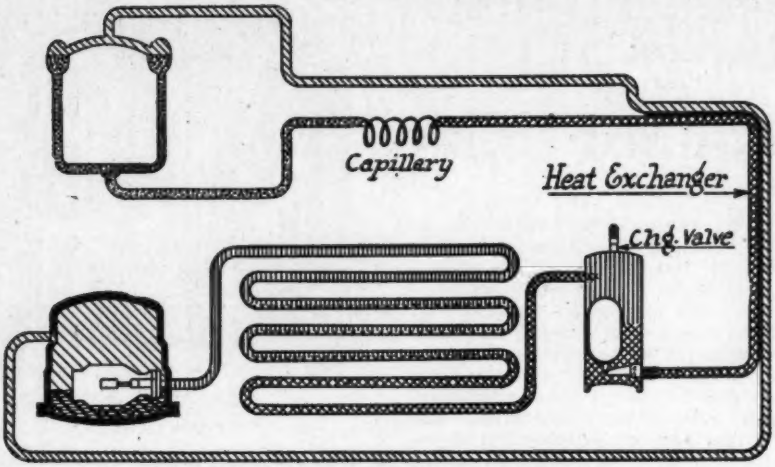



Fig. 3—Refrigerating cycle diagram of 1938 models.

field in the stator and starts the motor. As the motor speed increases the main winding current is reduced. At a predetermined condition the main winding current, which is also the current through the starting relay coil, will have dropped to a value below that necessary to hold up the starting relay armature. The armature drops, opening the starting winding contacts. The motor then continues to run as a single phase induction motor.

## Electrical Checking of Units Magnetic Relay Only

All electrical service on these units except actual motor failure can be performed in the field. Motor failure can be (1) Motor windings grounded; (2) Motor windings open; (3) Motor windings shorted. A complete check of the electrical system will require the following equipment: (1) Test lamp (Fig. 7); (2) Test starting leads; (3) Wattmeter.

## Attaching Test-Starting Leads

1. It is first necessary to determine whether the failure is in the motor or outside. To do this, first remove the three motor leads from the motor. Then connect the test-starting leads as illustrated. Insert plug in a convenient outlet, close the push button switch for 3 to 7 seconds and allow the push button switch to open. If the compressor starts when the push button switch is closed and then continues to run with the push button switch open, the compressor motor is all right and the trouble is elsewhere. In case motor does not operate when starting if attempted in this manner, the following tests may be made with the motor lead disconnected:

(a) Using test lamp, plug into a convenient outlet and ground one test point on the compressor housing. Place the other point successively on all three motor ter-

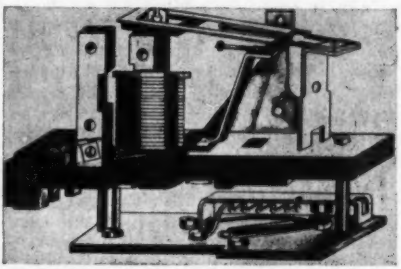


Fig. 4—The relay used on the early 1938 models.

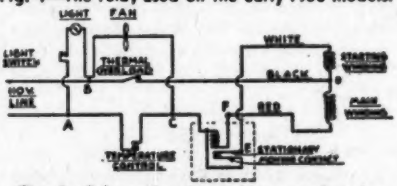



Fig. 5—Schematic wiring diagram of early 1938 models.

## KELVINATOR OIL & REFRIGERANT DATA

| Year | Model | Refrigerant Used | Refrigerant Amount | Oil | Refrigerant Control |
|---|---|---|---|---|---|
| 1938 | K3-38 | F-12 | 21 oz. | 2.2 lbs. | H.S.F. |
| | K4-38 | F-12 | 21 oz. | 2.2 lbs. | H.S.F. |
| | K5-38 | F-12 | 23 oz. | 2.2 lbs. | H.S.F. |
| | K6-38 | F-12 | 23 oz. | 2.2 lbs. | H.S.F. |
| | K7-38 | F-12 | 25 oz. | 2.2 lbs. | H.S.F. |
| | PK5-38 | F-12 | 23 oz. | 2.2 lbs. | H.S.F. |
| | PK6-38 | F-12 | 23 oz. | 2.2 lbs. | H.S.F. |
| | PK7-38 | F-12 | 25 oz. | 2.2 lbs. | H.S.F. |
| | KS5-38 | F-12 | 23 oz. | 2.2 lbs. | H.S.F. |
| | KS6-38 | F-12 | 23 oz. | 2.2 lbs. | H.S.F. |
| | KS7-38 | F-12 | 25 oz. | 2.2 lbs. | H.S.F. |
| 1939 | K4-39 | F-12 | 13 oz. | 2.18 lbs. | Cap. T. |
| | K5-39 | F-12 | 14 oz. | 2.18 lbs. | Cap. T. |
| | K6-39 | F-12 | 14 oz. | 2.18 lbs. | Cap. T. |
| | K8-39 | F-12 | 15 oz. | 2.18 lbs. | Cap. T. |
| | PK5-39 | F-12 | 14 oz. | 2.18 lbs. | Cap. T. |
| | PK6-39 | F-12 | 14 oz. | 2.18 lbs. | Cap. T. |
| | PK8-39 | F-12 | 15 oz. | 2.18 lbs. | Cap. T. |
| | KS3-39 | F-12 | 13 oz. | 2.18 lbs. | Cap. T. |
| | KS4-39 | F-12 | 13 oz. | 2.18 lbs. | Cap. T. |
| | KS5-39 | F-12 | 14 oz. | 2.18 lbs. | Cap. T. |
| | KS6-39 | F 12 | 14 oz. | 2.18 lbs. | Cap. T. |
| | KT6-39 | F-12 | 14 oz. | 2.18 lbs. | Cap. T. |
| 1940 | A-3 | F 12 | 13 oz. | 2.2 lbs. | Cap. T. |
| | A-4 | F-12 | 13 oz. | 2.2 lbs. | Cap. T. |
| | S-6 | F-12 | 14 oz. | 2.2 lbs. | Cap. T. |
| | S-8 | F-12 | 14 oz. | 2.2 lbs. | Cap. T. |
| | SS-6 | F-12 | 14 oz. | 2.2 lbs. | Cap. T. |
| | R-6 | F-12 | 14 oz. | 2.2 lbs. | Cap. T. |
| | R-8 | F-12 | 15 oz. | 2.2 lbs. | Cap. T. |
| | HS-6 | F-12 | 8 oz. | 2.2 lbs. | Cap. T. |
| | HD-6 | F-12 | 8 oz. | 2.2 lbs. | Cap. T. |
| | HD-8 | F-12 | 8 oz. | 2.2 lbs. | Cap. T. |
| 1941 | A-3 | F-12 | 13 oz. | 2.2 lbs. | Cap. T. |
| | A-4 | F-12 | 13 oz. | 2.2 lbs. | Cap. T. |
| | EA-4 | F-12 | 13 oz. | 2.2 lbs. | Cap. T. |
| | D6 | F-12 | 14 oz. | 2.2 lbs. | Cap. T. |
| | ED-6 | F-12 | 14 oz. | 2.2 lbs. | Cap. T. |
| | SS-6 | F-12 | 14 oz. | 2.2 lbs. | Cap. T. |
| | ESS-6 | F-12 | 14 oz. | 2.2 lbs. | Cap. T. |
| | S-6 | F-12 | 14 oz. | 2.2 lbs. | Cap. T. |
| | ES-6 | F-12 | 14 oz. | 2.2 lbs. | Cap. T. |
| | R-6 | F-12 | 14 oz. | 2.2 lbs. | Cap. T. |
| | ER-6 | F-12 | 14 oz. | 2.2 lbs. | Cap. T. |
| | PS-6 | F-12 | 14 oz. | 2.2 lbs. | Cap. T. |
| | S-8 | F-12 | 15 oz. | 2.2 lbs. | Cap. T. |
| | ES-8 | F-12 | 15 oz. | 2.2 lbs. | Cap. T. |
| | M-6 | F-12 | Primary 8½ oz. | 2.2 lbs. | Cap. T. |
| | EM-6 | F-12 | Primary 8½ oz. | 2.2 lbs. | Cap. T. |
| | M-8 | F-12 | Primary 8½ oz. | 2.2 lbs. | Cap. T. |
| | EM-8 | F-12 | Primary 8½ oz. | 2.2 lbs. | Cap. T. |
| | SR-20 | F-12 | 29 oz. | | Cap. T. |
| | SRI-20 | F-12 | 32 oz. | | Cap. T. |
| 1942 | SS-7 | F-12 | 9 oz. | 2.2 lbs. | Cap. T. |
| | S-7 | F-12 | 9 oz. | 2.2 lbs. | Cap. T. |
| | R-7 | F-12 | 9 oz. | 2.2 lbs. | Cap. T. |
| | S-9 | F-12 | 9 oz. | 2.2 lbs. | Cap. T. |
| | M-7 | F-12 | Primary 8.5 oz. | 2.2 lbs. | Cap. T. |
| | M-9 | F-12 | Primary 8.5 oz. | 2.2 lbs. | Cap. T. |
| | SR-20 | F-12 | 29 oz. | | Cap. T. |
| | SRI-20 | F-12 | 23 oz. | | Cap. T. |
| | SR-30 | F-12 | 20 oz. | | Cap. T. |
| 1946 | CS7 | F-12 | 11 oz. | 2.2 lbs. | Cap. T. |
| | C7 | F-12 | 11 oz. | 2.2 lbs. | Cap. T. |
| | CD7 | F-12 | 9 oz. | 2.2 lbs. | Cap. T. |
| | MM9 | F-12 | Primary 17 oz.<br>Secondary 14 oz. | | Cap. T. |

## LEONARD OIL & REFRIGERANT DATA

| Year | Model | Refrigerant Used | Refrigerant Amount | Oil | Refrigerant Control |
|---|---|---|---|---|---|
| 1939 | L5-39 | F-12 | 14 oz. | 2.18 lbs. | Cap. T. |
| | L6-39 | F-12 | 14 oz. | 2.18 lbs. | Cap. T. |
| | L7-39 | F-12 | 15 oz. | 2 18 lbs. | Cap. T. |
| | LS4-39 | F-12 | 13 oz. | 2.18 lbs. | Cap. T. |
| | LS5-39 | F-12 | 14 oz. | 2.18 lbs. | Cap. T. |
| | LS6-39 | F-12 | 14 oz. | 2.18 lbs. | Cap. T. |
| | LC6-39 | F-12 | 13 oz. | 2.18 lbs. | Cap. T. |
| | P5-39 | F-12 | 14 oz. | 2.18 lbs. | Cap. T. |
| | P6-39 | F-12 | 14 oz. | 2.18 lbs. | Cap. T. |
| 1940 | LS-6 | F-12 | 14 oz. | 2.2 lbs. | Cap. T. |
| | LS-8 | F-12 | 14 oz. | 2.2 lbs. | Cap. T. |
| | LSS-6 | F-12 | 14 oz. | 2.2 lbs. | Cap. T. |
| | LR-6 | F-12 | 14 oz. | 2.2 lbs. | Cap. T. |
| | LR-8 | F-12 | 15 oz. | 2.2 lbs. | Cap. T. |
| | LHS-6 | F-12 | 8 oz. | 2.2 lbs. | Cap. T. |
| | LHD-6 | F-12 | 8 oz. | 2.2 lbs. | Cap. T. |
| | LHD-8 | F-12 | 8 oz. | 2.2 lbs. | Cap. T. |
| 1941 | LD-6 | F-12 | 14 oz. | 2.2 lbs. | Cap. T. |
| | ELD-6 | F-12 | 14 oz. | 2.2 lbs. | Cap. T. |
| | LSS-6 | F-12 | 14 oz. | 2.2 lbs. | Cap. T. |
| | ELSS-6 | F-12 | 14 oz. | 2.2 lbs. | Cap. T. |
| | LS-6 | F-12 | 14 oz. | 2.2 lbs. | Cap. T. |
| | ELS-6 | F-12 | 14 oz. | 2.2 lbs. | Cap. T. |
| | LR-6 | F-12 | 14 oz. | 2.2 lbs. | Cap. T. |
| | ELR-6 | F-12 | 14 oz. | 2.2 lbs. | Cap. T. |
| | LS-8 | F-12 | 15 oz. | 2.2 lbs. | Cap. T. |
| | ELS-8 | F-12 | 15 oz. | 2.2 lbs. | Cap. T. |
| | LH-6 | F-12 | Primary 8½ oz. | 2.2 lbs. | Cap. T. |
| | ELH-6 | F-12 | Primary 8½ oz. | 2.2 lbs. | Cap. T. |
| | LH-8 | F-12 | Primary 8½ oz. | 2.2 lbs. | Cap. T. |
| | ELH-8 | F-12 | Primary 8½ oz. | 2.2 lbs. | Cap. T. |
| 1942 | LSS-7 | F-12 | 9 oz. | 2.2 lbs. | Cap. T. |
| | LS-7 | F-12 | 9 oz. | 2.2 lbs. | Cap. T. |
| | LR-7 | F-12 | 9 oz. | 2.2 lbs. | Cap. T. |
| | LS-9 | F-12 | 9 oz. | 2.2 lbs. | Cap. T. |
| | LH-7 | F-12 | Primary 8.5 oz. | 2.2 lbs. | Cap. T. |
| | LH-9 | F-12 | Primary 8.5 oz. | 2.2 lbs. | Cap. T. |
| 1946 | SL-7 | F-12 | 11 oz. | 2.2 lbs. | Cap. T. |
| | L7 | F-12 | 11 oz. | 2.2 lbs. | Cap. T. |
| | DL7 | F-12 | 9 oz. | 2.2 lbs. | Cap. T. |
| | HL9 | F-12 | Primary 17 oz.<br>Secondary 14 oz. | | Cap. T. |

minals. If lamp lights, a grounded motor winding is indicated.

(b) Using test lamp, plug into a convenient outlet. Place test points on 1 and 2, 2 and 3, and 1 and 3. If the lamp does not light in each case, an open winding is indicated.

(c) Connect a wattmeter in the motor circuit using the test starting leads for manual starting. Plug in the cabinet plug and close the temperature control switch so that the fan will operate. Start the compressor. Wattage in excess of 200 indicates either shorted windings or an excessive motor load. In either case the unit should be changed.

2. If the procedure in No. 1 indicates that the compressor motor is all right, the following procedure will locate the electrical trouble:

(a) *Thermal Overload Open.* Use test lamp with terminal shorted. Plug in the unit service cord and close the temperature control switch. Place the test lamp points on relay terminals A and B and then on A and D. If the lamp lights on the first position and not on the second, the thermal overload is open.

(b) *Relay Contacts Stuck Closed.* Use test lamp with terminals shorted. Plug in the service cord, place the test points on terminals E and D and close temperature control switch. The lamp should first burn brightly and then dim to about one-half

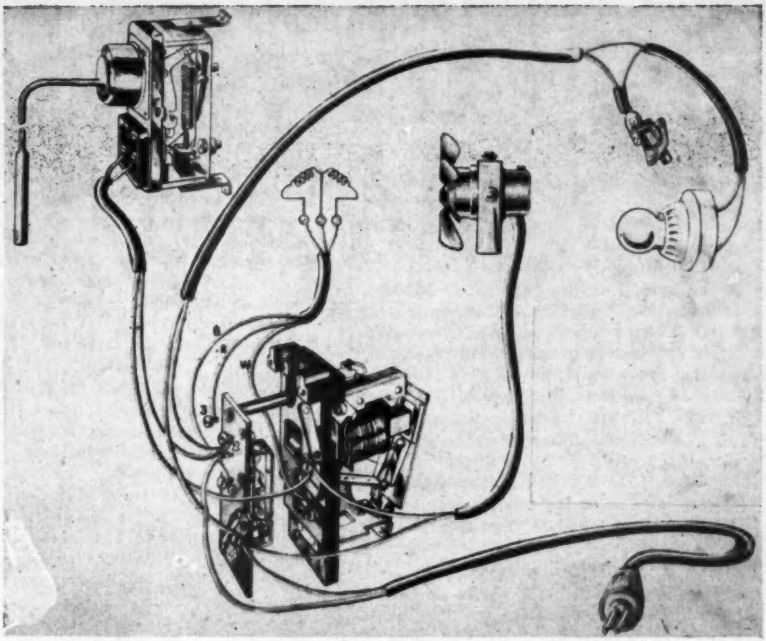


Fig. 6—Terminal-to-terminal diagram of early 1938 models.

brilliancy when the relay contacts open. If the lamp remains brightly lighted, the relay contacts are stuck closed.

(c) *Relay Contacts Fail to Close.* With the relay contacts stuck open the motor will not start when the procedure in (b) is followed and the lamp will not light.

(d) *Starting Relay Opening Too Soon.* Follow procedure outlined under (b). If the lamp alternately burns brightly and dim the relay contacts are opening before the proper motor speed is reached and a new relay is required.

(e) *Broken Lines.* Remove the lead wires from the compressor. Use test lamp plugged into convenient receptacle. In succession place the test points in the following position; place tips on B and D, A and C (thermostat closed), C and F, E and white lead wire, D and black lead wire, F and red lead wire. The failure of the lamp to light indicates an open circuit between the points checked.

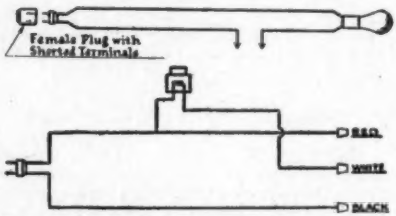



Fig. 7—Test lamp above and starting leads below, used in checking electrical circuit.

(f) *Thermostat Contacts Open.* Previous check (e) covers this in check between A and C.

(g) *Ground in Wiring.* Remove unit service plug. Use test lamp and disconnect the unit service plug. Remove the leads at the compressor. Plug in the test lamp to a convenient outlet. Ground one test tip to the condensing unit base. Place the other test tip successively on all relay terminals. If the lamp lights, a ground is indicated at that point.

## Mechanical Service

Since it is impossible to attach gauges to this system, indications of refrigerant shortage must be from a visual inspection of the

*(Continued on page 80)*

# QUESTIONS and ANSWERS

On Problems of Servicing and Installation of Refrigerating Equipment—Send Your Problems to the Question Box.

## COMMENTS ON QUESTIONS

REFERENCE TO QUESTION 760—I have had a very similar experience with a Frigidaire refrigerator using a high side float. I could not lick it "as was" so I removed the liquid temperature valve and installed a small Mayson automatic expansion valve, flooded the high side float with gas until it remained constantly wide open. The unit has been operating satisfactorily for over nine months. I have since been told that a small thermostatic valve would have been an even better solution.—*E. L. Wheeler, Fowler, Indiana.*

REFERENCE TO QUESTION 784—I think the answer is a good big dehydrator and filter. In the first place, an oil logged Norge evaporator is caused from a leaky check valve in the suction service valve which forces the oil back up the suction line in the off cycle. In the second place, the Norge evaporator is constructed with wicks and a special made suction tube inside the evaporator that will right an oil log trouble by just running units. Of course heating will help some, but tipping down the front won't help much. In the third place, don't tell a green man to remove a Norge float. He may have difficulty in replacing it, as the evaporator head is soldered in and Norge float valves are calibrated at the factory so recalibration, as far as I can see, is impossible. —*Lee M. Johnson, Kingfisher, Okla.*

REFERENCE TO QUESTION 779—I have had three service jobs similar to the one described in this question. One on a Norge, another a Universal and last a Kelvinator where the motor would not turn over the compressor on starting. These were all household boxes, one using low side float, automatic expansion valve and the last a high side float. These jobs would all run for days and even weeks, then suddenly the motor would just sit there and hum.

The compressor on all the jobs turned free enough but I noticed when the motor trouble came in I would always find the compressor at the top of a stroke where it would be a little harder to start but still not really sticking and could be moved by one hand. Upon questioning the customers I found the motor stalled at starting and not after it had run a few seconds, eliminating slugging of oil or gas. All of the jobs froze well with no freezing back. After several calls on the Norge, and ending up replacing motor starting switch and condenser, I received no more complaints.

The Universal (repulsion-induction motor) ended up in finding wires just twisted on thermostat terminals and rather loose, after spending hours of checking. This has been only a week so am waiting to see what happens.

On the Kelvinator high side float, I checked the compressor oil and gas charge. I found the belt very loose and I tightened it. I spent three hours with this one and it worked perfectly and as I was leaving for the car, the thermostat kicked in and motor stalled. I have taken the motor to the shop. The question is "Is all this trouble due to poor switch contacts in motor or thermo?" These refrigerators were not located in the same locality and always had plenty of voltage at receptacle.

I have been in this business for seven years but never had I run on anything like this trouble. What puzzles me is why does it just happen at certain times? I can turn the compressor to top of stroke, throw the switch and away it goes and yet when I turn my back it happens. I have even had two of these motors in an electric shop and the report was that the motor was OK and the trouble must be the compressor.—*Melvin Harms, Lake Villa, Ill.*

## CALCULATING HEAT LOADS

QUESTION 790: Would you kindly give me some information on estimating the heat loads in walk-in refrigerators and also how to figure the tonnage of ice machines?

We have a milk storage room 46′ x 30′ x 9′ high insulated with 4″ corkboard, desired

inside temperature 36 degrees mean outside temperature 90 degrees. The live load consists of 30,000 lbs. milk per day entering cooler at 46 degrees. I figured this heat load according to the book "Refrigeration Theory and Applications" by Prof. Venemann. Using a U factor of .07 and a service factor of 1.2 I arrived at 3.7 tons which I am told is high.

We also have an ice cream hardening room 26' x 16' x 9' high insulated with 8" corkboard. Outside temperature 90 degrees, desired inside temperature —30 degrees. The ice cream entering this room comes direct from a 60 gal. per hour continuous freezer at a discharge temperature of 24 degrees, which operates on an 8 hour day with an output of 480 gallons. On page 232 of the above book by Prof. Venemann, it gives examples of class 1 and class 2 loads, but these solutions do not take care of the above problem. The above load was figured by an engineer at 4½ actual tons. Would you kindly give me the solution to work out these heat loads? How would you compute the tonnage of a 5½" x 5½" vertical ammonia compressor at 19.6 lbs. suction pressure and also 0 lbs. suction pressure?

ANSWER: The details of our analysis are shown below. In connection with it, we have made certain assumptions where detailed data was not supplied.

Milk Storage Room:

46×30×9 ft. with 4 in. corkboard all around.

| | Btu. per hr. |
|---|---|
| Walls (46+30) 2×9× .061× (90-36) | = 4490 |
| Ceiling 46×30× .065 ×(120-36) | = 7550 |
| Floor 46×30× .065 ×(55-36) | = 1705 |
| | 13,745 |
| Add 20% for lights, air change, etc. | 2,749 |

Milk Cooling Load

| | Btu. per hr. |
|---|---|
| 30,000×.9×(46-36)/24 | 11,250 |
| Total load is..... | 27,644 |

or Total load is 2.8 tons Refrigeration

Hardening Room

26×16×9 ft. with 8 in. corkboard all around.

| | Btu. per hr. |
|---|---|
| Walls (26+16) 2×9×.033× [90-(-30)] | = 3,000 |
| Ceiling 26×16×.033× [120-(-60)] | = 2,060 |
| Floor 26×16×.033× [55-(-30)] | = 1,170 |
| | 6,230 |

Ice Cream Load

| | Btu. per hr. |
|---|---|
| 590 Btu. per gal. × 450/24 | =11,050 |
| Total load is..... | 17,280 |

or Total load is 1.44 tons Refrigeration

For instance, the total tonnage calculated for your milk storage is 2.3 tons refrigeration. In connection with the calculations, we have assumed an attic space above the ceiling which would give a peak temperature around 120 degrees. The milk cooling load runs a little less than half the total with full cooling, to 36 degrees. In large cans it probably would not drop that low but, on the other hand, there would probably not be uniform loading so that a higher capacity would be required over short periods.

In the hardening room calculation we have used an overall factor of 590 Btu. per gallon of ice cream. This is taken from page 174 of the Refrigerating Data Book —Volume 1. This provides a more rapid method of calculation although, naturally, it is not as accurate as the method Professor Venemann gives. Also his book is a text book and therefore it follows the methods of detailed calculations.

Here again our result is based on uniform loading with gravity air circulation. Probably a large proportion of the ice cream is loaded into the room over a period of a few hours, and also you may employ forced air circulation. In that case more refrigerating capacity would be required to maintain room temperature and hardening the ice cream at the optimum.

You do not give the speed of the 5½ x 5½ ammonia compressor. It has a displacement of 15.12 cu. ft. per minute per 100 rpm. Operating at 20 and 155 lbs. gage, it has a capacity of 3.4 tons per 100 rpm. With zero suction pressure and 155 lbs. discharge, it has a capacity of 1.16 tons per 100 rpm. The zero suction pressure is rather low for a single stage machine unless you have very cool condensing water so that the discharge pressure is less than the 155 lbs. we have assumed.

S S S

TODAY we have 29 million electric meters in use, and the consensus of estimates indicates that the figure will reach 33 million by the end of 1950. At present, we have about 22 million refrigerators in use, while estimates indicate that we may possibly have 30 million in use by the end of 1950. This indicates a net probable increase of eight million refrigerators.

# SERVICE POINTERS

**A department for the exchange of ideas on new devices and methods of improving service work. Five dollars is paid for each pointer published. Write up your idea today and mail it to the Service Pointer Editor.**

## CARE OF MOTORS

All 3 hp. and larger "Oil Ring Type" sleeve bearing motors are shipped with dry oil reservoirs, and the reservoirs must be filled with No. 20 S.A.E. motor oil before starting the motor.

Fractional and integral horsepower motors up to and including 2 hp. used on refrigeration condensing units have oil-soaked wool wicking around the motor shaft that usually provides lubrication for a short period of time. However, 3 hp. and larger motors used in the refrigeration industry have an oil ring much larger in diameter than the motor shaft to carry the oil from the reservoir up and over the motor shaft. Hence, the necessity for filling the oil reservoir before starting the motor. It is also recommended that you remove the reservoir cover to inspect the oil ring to determine whether or not it turns freely on the shaft.

Service engineers should oil the motor, remove the belts and let the motor run without load for a few minutes to insure proper lubrication of the motor bearings before starting the motor with the load of the condensing unit on it.

If you start a 3 hp. or larger electric motor without filling the oil reservoir, the motor shaft and bearing will "gall" within minutes. "Galling" is many times evidenced by a momentary "whining," "whistling" or "screeching" sound. After this happens, the damage is done—and oiling the motor is of no avail. Then, the only remedy is replacement of the bearings.

Bearing failure in "Oil Ring Type" motors, due to lack of oil, is "misuse and abuse" and voids the warranty.

### Check Heater Rating

Before starting the condensing unit, be sure to check the heater coil rating in the starter against the amperage rating on the electric motor. The heater coil rating may exceed the amperage rating of the motor by 125% to 140% of the full load capacity of the motor, but the heater coil rating must not exceed the motor rating by more than 140%. Do not depend on the manufacturer to supply the proper heater coil; errors do happen. It is your responsibility to see that the starter has the proper heater coil. If a heavier heater coil is required to prevent "kick-out" of motor starter, find the cause for the overload on the motor. The cause may be one or more of the following:

### Causes of Overloads

(a) Suction pressure above the rated design of the condensing unit.

(b) High head pressure.

(c) Low voltage.

(d) Electric power conductors (lines) too small.

(e) Belts too tight.

(f) Compressor body parts too tight.

(g) Motor bearings tight or improperly lubricated.

(h) Leaking discharge valves in valve plate assembly.

(i) Overcharge of refrigerant.

(j) Discharge service valve on compressor body or receiver outlet valve not opened properly.

(k) Either insufficient amount of water or water at too high a temperature for the requirements of the water-cooled condenser.

(l) Condensing unit too small.

(m) Pulley specifications improper (too large) for the particular application of the condensing unit.

(n) Air (non-condensables) in system.

(o) Water flowing in wrong direction thru the condenser or water valve.

(p) Water connections to condenser may be wrong.

(q) Cross-the-line starter may be in a hot or unventilated location, resulting in the ambient heat causing the starter to "kick-out."

Heater coils in the magnetic starter do not protect 3-phase motors against burn-out if one phase of the power source fails for

any cause. Failure of one phase in a 3-phase electric circuit is referred to as "single phasing." The warranty on an electric motor is not applicable in case of failure of a motor due to "single phasing."—*Submitted by J. H. Spence, Hussman Refrigeration, Inc.*

S S S

## INSTALLATION OF DRIERS

FIGURE 1 illustrates the incorrect installation of a drier. Notice the inlet end of the drier is facing down. Due to the liquid pulsations caused by the operation of the expansion valve, the silica gel, which should be packed, becomes loose, then has a tendency to chip until a fine powder is formed which deposits on the face of the lamb's wool (outlet) filter pad. This condition can possibly reduce the liquid flow until the efficiency of the system is seriously affected.

If the drier is installed as in Fig. 2, this condition will not develop. Now the inlet end of the drier is facing up. In this position the pulsations in the system will make the silica gel pack even tighter, thus there will be a minimum of chipping and the drier will operate normally.

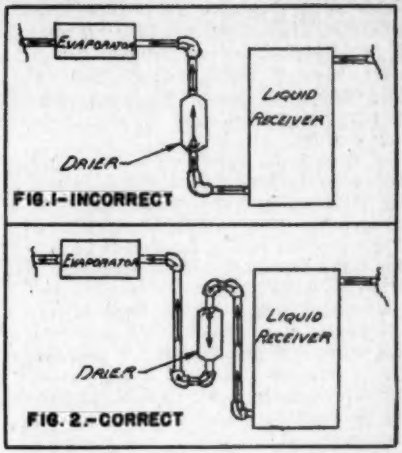


FIG. 1—INCORRECT

FIG. 2.—CORRECT

Silica Gel does not dissolve and being a hard glass-like substance, resists the wearing action of liquids passing through it. But, loosely packed silica gel stirred up by incoming liquids causing the granules to turn one against another, sets up a grinding action which chips and grinds it into a fine powder.

"AH HOPES DESE CUBES HOLD UP 'TIL AH MAKES MAH POINT!"

## APPLIANCE DISPLAY IN BANK PROMOTES TIME PURCHASING PLAN

WHEN appliances are actually sold in a bank it might indicate that the money business is slow. It might also indicate that someone has come up with an entirely new sales idea.

The Ridgewood, New York, branch of the Manufacturers Trust Company is doing just this, allowing appliances to be sold there. Although a local appliance dealer is doing the actual selling, the bank is cooperating. Manufacturers Trust Company is an institution with $2,250,000,000 resources and 73 branches throughout New York City.

On display in one corner of the large bank lobby at 55-60 Myrtle Avenue is a Launderall automatic home laundry, Kelvinator refrigerator, console model Crosley combination radio-phonograph and Maytag washing machine.

It all started about eight months ago when Sam Ulanoff, who owns the appliance store called Ulan & Co. at 55-01 Myrtle Avenue, Ridgewood, decided that perhaps he could get some benefit out of the large amount of time sales business he had been giving Manufacturers Trust.

"With new appliances becoming available," Ulanoff explains, "my business prospects appeared to warrant opening a branch store or at least another sales office. It occurred to me that if I could set up a regular display showing post-war appliances in the leading Ridgewood bank, the Manufacturers Trust, and have a man taking orders there, I could benefit myself and the bank."

Realizing the radical nature of such a scheme to the conservative banker's mind, Ulanoff broached the matter gently with the Manager of Consumer Credit. He pointed out that his great yearly time sales business going to the one bank probably constituted their greatest amount of "paper" business from one source. With the bank's cooperation, he told him, this could be increased considerably and the fact that they handle "paper" could be publicized.

"I particularly emphasized the fact that by presenting only the newest and most modern items," Ulanoff explained, "goodwill could be built up between the bank and the local citizenry.

"It took months till I managed to obtain full authorization. This finally came directly from the company's board of directors. Even now, extreme conservatives of the bank are not convinced that my display is entirely in order with the decorum usually expected of a bank."

Although Ulanoff or one of his salesmen is usually in attendance to speak with interested parties, a bank employee sometimes does the honors when the occasion arises and no representative of Ulan & Co. is present.

"The project's feasibility," Ulanoff says, "is indicated by the first week's results. More than a dozen orders were taken because of the display at the bank. The majority were for Launderall. Cards and pamphlets on the display bearing our name send many new customers to the store. It's just like having a regular branch office"


After they have completed banking transactions, prospective customers visit appliance display in Ridgewood, New York, branch of Manufacturers Trust Company where local appliance dealer, Ulan & Co., has full exhibit installed. When salesman, at right, is absent, bank employee speaks with interested parties. Display serves as Ulan branch office while promoting bank's "Time Purchase Plan."

*Second Article*

**The introductory article of this series, designed to aid the less experienced contractor bid on an equal footing with the older contractor, appeared in the April issue. This, the second of the series, discusses the method of estimating material and sub-contracting costs. It is the first step in figuring the total cost of a job.**

# *Take the Guess out of* Estimating

By DONALD F. DALY

SINCE I couldn't find any short-cut method of estimating it seems to me that the best approach to the subject would be to take a medium sized commercial installation and see how it was handled by the contractor who did the job. If the novice estimator will follow the methods outlined he will be able to arrive at a cost for his jobs in the same manner that more experienced operators use. In course of time said novice operator can, if he is sharp and keeps adequate records, join that elite group of estimators who go by intuition.

This installation, a large cafeteria, was completed by a local contractor a few months ago. I did most of the actual installation work so I am thoroughly familiar with it. This was not a new installation. It was to replace an ammonia plant and a brine circulated system. The method of estimating cost of material and labor is similar to that used by the contractor.

## The Work to be Done

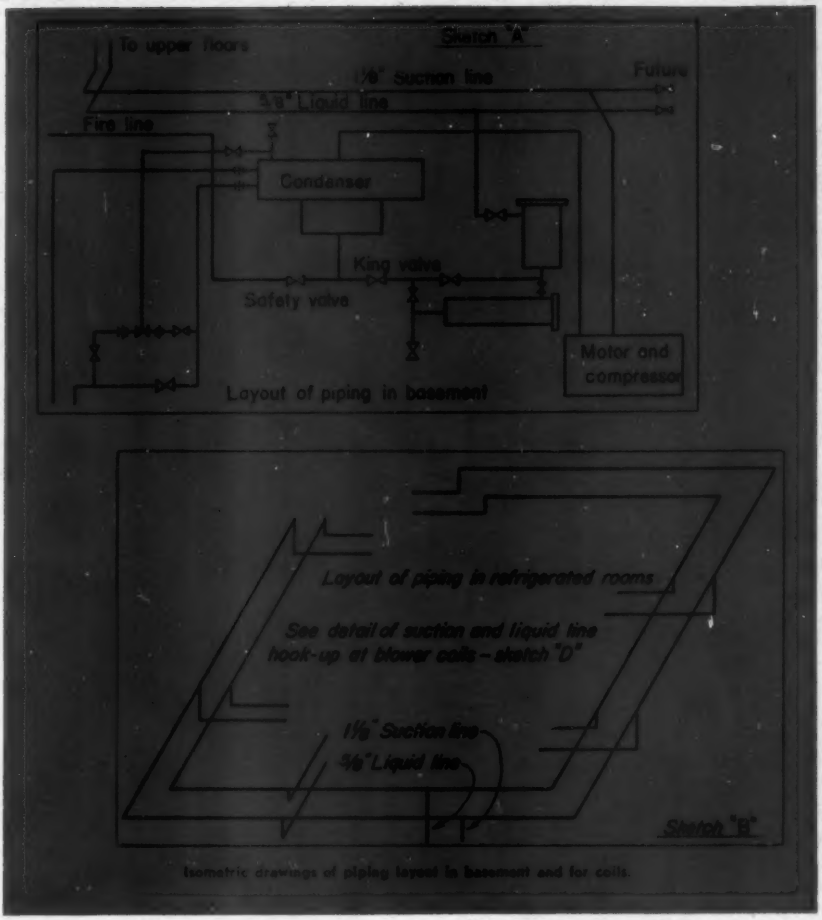
The boxes were tile inside and out which presented a rather difficult problem of getting hangers for the coils and piping on these finished surfaces. However, we found that by bridging across with 2" x 6" boards we could use the same bolts to hang our blower coils that had been used to support the brine coils. We could also use many of the trapeze hangers that had been used to hang the runs of brine piping from the basement to the refrigerated spaces. Another saving was made by using the same penetrations through the walls of the box that had been used before. A new concrete motor and compressor base had to be built and a section of the basement floor had to be patched. Access to the machinery space was on the street level so there was no rigging problem. Every control that was necessary was used, and shut-off valves were installed wherever they were needed to facilitate repairs. All in all, it was a pretty routine job.

In refrigeration work it is very seldom that the contractor is supplied with plans and specifications. He not only has to figure his refrigeration requirements, he has to make up his own plans and specifications. Therefore, I would say that the first step in estimating a job would be to draw some sort of plan or sketch. These sketches need not be elaborate. Simple drawings such as those shown in sketches A. B. C. & D. are easy to make and show the principal parts of the job in such a way that it is easy to pick out all of the component parts with ease. This type of drawing was known to the old time mechanics as the figure-four plan. I used it for many years before I learned that it had another name. Isometric. If it isn't possible to draw this type of sketch, any rough diagram that shows the location of the various parts of the plant will suffice. However, an effort should be made to show the main items such


Spaces to be refrigerated.

## Estimate Sheets for Blank Cafeteria

| No. | Size | Item | No. Req. | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| 1 | 3 hp | Condensing unit with water cooled cond. Hi. Low switch, starter switch and water V. | 1 | ..... | $445.00 |
| 2 | .... | Ninety pounds Freon 12 | 90 lbs. | $ 0.56 | 50.40 |
| 3 | .... | Blower coils 3150 BTU per hour | 3 | 122.00 | 366.00 |
| 4 | .... | Two-way dome coils 2250 BTU per hour | 2 | 118.00 | 236.00 |
| 5 | .... | Four-way dome coil 6000 BTU per hour | 1 | 216.00 | 216.00 |
| 6 | ⅛"x⅜" | Expansion valves | 6 | 11.00 | 66.00 |
| 7 | ⅜" | Solenoid valves | 6 | 9.15 | 54.90 |
| 8 | .... | Room thermostats | 6 | 9.60 | 57.60 |
| 9 | ⅛" | Line shut-off valves | 12 | 3.75 | 45.00 |
| 10 | ⅜" | Line shut-off valves | 9 | 2.85 | 25.65 |
| 11 | ¼" | Line shut-off valves | 1 | 2.75 | 2.75 |
| 12 | ⅜" | Charging valve | 1 | 4.50 | 4.50 |
| 13 | ¼" | Purge valve | 1 | 4.50 | 4.50 |
| 14 | ⅜" | Safety valve | 1 | 4.50 | 4.50 |
| 15 | ⅜" | Dehydrator shell | 1 | 34.50 | 34.50 |
| 16 | 2" | Dehydrator cartridges | 6 | 2.25 | 13.50 |
| 17 | ⅜" | Strainer shell | 1 | 9.00 | 9.00 |
| 18 | 1⅜" | Copper tubing | 12' | .35 | 4.20 |
| 19 | 1⅛" | Copper tubing | 120' | .29 | 34.80 |
| 20 | ⅞" | Copper tubing | 16' | .26 | 4.16 |
| 21 | ⅝" | Copper tubing | 220' | .23 | 50.60 |
| 22 | ½" | Copper tubing | 100' | .12 | 12.00 |
| 23 | ¼" | Copper tubing | 50' | .06 | 3.00 |
| 24 | 1⅛" | O.D. Copper 90 degree ells | 8 | .34 | 2.72 |
| 25 | ⅞" | O.D. Copper 90 degree ells | 4 | .18 | .72 |
| 26 | ½" | O.D. Copper 90 degree ells | 40 | .11 | 4.40 |
| 27 | ⅝" | O.D. Copper 90 degree ells | 36 | .10 | .360 |
| 28 | ½" | O.D. Copper 90 degree ells | 4 | .10 | .40 |
| 29 | 1⅛"x1⅛"x1⅜" | O.D. Copper red. tee | 1 | .76 | .76 |
| 30 | ⅞"x⅞"x⅜" | O.D. Copper red. tee | 1 | .33 | .33 |
| 31 | 1⅛" | O.D. Copper tee | 1 | .46 | .46 |
| 32 | 1⅛"x1⅛"x⅝" | O.D. Copper red. tee | 6 | .76 | 4.56 |
| 33 | ⅝" | O.D. Copper tee | 6 | .17 | 1.02 |
| 34 | ⅝"x⅝"x⅜" | O.D. Copper red. tee | 6 | .26 | 1.56 |
| 35 | ¼" | O.D. Copper tee | 1 | .14 | .14 |
| 36 | ⅝" | Flare unions | 6 | .52 | 3.12 |
| 37 | ⅝" | Flare nuts | 12 | .24 | 2.88 |
| 38 | ⅜" | Flare unions | 6 | .23 | 1.38 |
| 39 | ⅜" | Flare nuts | 12 | .23 | 2.76 |
| 40 | ¼" | Flare nuts | 12 | .14 | 1.68 |
| 41 | .... | Angle iron brackets for condenser | 2 | 6.00 | 12.00 |
| | | Total cost of material and equipment | | | $1789.05 |
| | | 40% mark-up on cost of material | | | 715.60 |
| | | 2% mark-up for incidentals* | | | 50.09 |
| | | 10% mark-up for labor | | | 250.40 |
| | | 3% State sales tax on material | | | 75.14 |
| | | *2% of total material cost for incidentals, hangers, bolts, screws, emery cloth, sil-fos, flux, and etc. | | | |
| | | Sub-contract for cement work. Motor base, patching floors, and etc. Lowest of two bids. $80.00 plus 10% | | | 88.00 |
| | | Sub-contract for electrical work: motor, fans, solenoid circuits, and etc. Lowest of three bids, $160.00 plus 10% | | | 176.00 |
| | | Total cost of installation | | | $3144.28 |




Isometric drawings of piping layout in basement and for coils.

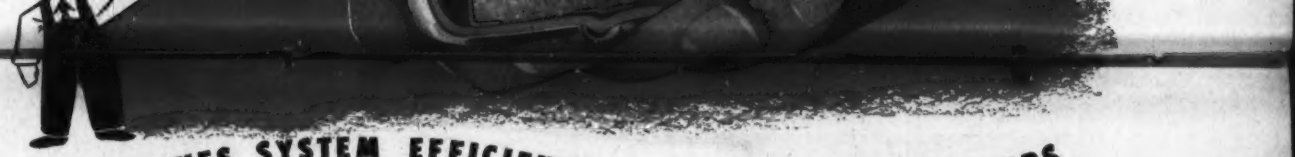
as condensing units, coils, expansion valves, room thermostats, solenoid valves, and etc. These are the most costly items and if some of them are overlooked it may mean a loss on the job.

Once these diagrams or sketches are made the problem of taking off the material is simple. If the job is at all complex it would be better to break it up into sections and make several drawings. You are less apt to miss something this way. It is a simple matter to take off the pipe fittings; wherever a branch is taken off the main, a tee will be needed; where the pipe takes a turn a 90% or 45% ell will be required. Some of the smaller tubing will be bent but it is better to allow a fitting wherever the piping runs show a turn. It may be that you won't have room for a bend and if you don't have the fitting on hand time may be lost in getting it from the supply house or shop. For these small fittings, labor costs more than material and any overage can go back into stock. In fact, some estimators follow the practice of over estimating these small fittings by as much as 25 percent. They consider this a painless method of building up a stock of small parts. Especially when business is good. More about this anon.

Now that the sketches have been drawn and the material list has been made up on that shingle or piece of cardboard, or whatever happened to be handy, the next step is to make up some sort of estimate sheet similar to those used on the Blank Cafeteria job. It would be advisable to make up these sheets in duplicate. Then take the carbon copy and as you go through your catalogue mark down

(*Continued on page* 78)

TAKE DIRT AND MOISTURE OUT OF YOUR REFRIGERATION
SYSTEMS FAST.... with a TRAP-DRI ....
DRIER — FILTER — STRAINER



## ● IMPROVES SYSTEM EFFICIENCY . . . PREVENTS FREEZE-UPS

The A-P TRAP-DRI will save you many costly callbacks . . . enabling you to avoid minor service troubles due to dirt, solder particles, scale, gummy deposits, acids and moisture.

These troublesome impurities are trapped and taken out of your system immediately, with a TRAP-DRI on the job. Offering *no appreciable pressure drop*, it provides a filter unit as effective as a 900-mesh strainer . . . *plus* a highly efficient charge of Silica Gel capable of absorbing up to 16 per cent of its weight in moisture—far more than other drying agents.

Put the A-P TRAP-DRI to work for your benefit on every job—for savings in service time, improved valve operation and cost-savings for your customers. Use it on new or present installations. Three sizes are stocked by leading refrigeration parts jobbers. See them—or write for latest bulletin No. TD-110.

**SEE THIS CUTAWAY SAMPLE OF THE TRAP-DRI AT YOUR JOBBER**

It graphically illustrates the design and construction of TRAP-DRI with its high-efficiency honeycomb filter and high-capacity Silica Gel drier.

# AUTOMATIC PRODUCTS COMPANY

2454 [illegible]

[illegible]

DEPENDABLE *Refrigerant Valves*

STOCKED AND SOLD BY GOOD REFRIGERATION JOBBERS EVERYWHERE . . . . . RECOMMENDED AND INSTALLED BY [illegible] REFRIGERATION SERVICE ENGINEERS

# Refrigeration Equipment Manufacturers Association Holds Spring Conference

New officers, directors and members of the advisory board of the Refrigeration Equipment Manufacturers Association. Front row—Left to Right—John M. Schlemmer, Minneapolis, new director; R. H. Israel, West Norfolk, Va., treasurer; E. M. Flannery, Hartford, Conn., president; H. F. Hildreth, Springfield, Mass., vice-president; and K. B. Thorndike, Chicago secretary. Back row—Left to Right—H. C. Morrison, St. Louis, director; G E. Graff, Columbus, O., director; R. H. Luscombe, Goshen, Ind., past president; Herman F. Spoehrer, St. Louis, retiring president; W. H. Maxwell, Detroit, director; J. W. Krall, Niles, Mich., director; Earl A. Vallee, Milwaukee, Wis., past president; and G. M. Kingsland, Minneapolis, new director.

MEMBERS of the Refrigeration Equipment Manufacturers Association met in their annual Spring conference at the Edgewater Beach Hotel, Chicago, April 9, 10 and 11, to transact the annual business of the association; to hear key addresses on merchandising and marketing; hear progress reports on various association activities and the 5th annual All-Industry Refrigeration and Air Conditioning Exposition to be held in Cleveland, January, 1948. The first and final day of the conference was reserved for Board of Directors and product group meetings, and the second day was reserved for the general membership meeting.

Herman F. Spoehrer, St. Louis, in presenting the President's annual message at the general membership meeting, reported the association had increased its membership during the past year from 86 to 102 members, and recommended the adoption of the suggestion of the Board of Directors to change the by-laws requiring that future members be accepted by invitation only, and that new members must qualify by having been in the business of manufacturing air conditioning and refrigeration equipment for not less than two succeeding years prior to their application. A majority vote of the Directors would then be necessary for election. An "escape" clause would make it possible for a two-thirds majority vote of the Directors to elect members in certain cases without the foregoing requirement.

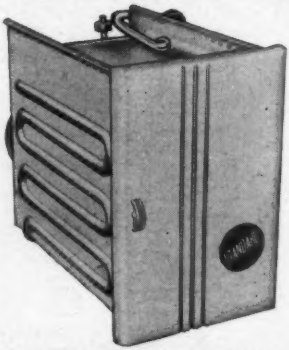
President Spoehrer reviewed briefly the success of the 4th All-Industry Refrigeration and Air Conditioning Exposition and stated that 11,434 persons identified with the refrigeration field attended the Exposition and that the total registration, including general admission, was in the neighborhood of 20,000. A major portion of the revenue from the Exposition is being expended to further the public relations program which REMA feels will reflect to the advantage of the entire industry. He cited the accomplishments of K. B. Thorndike, former Chairman of the Show Committee, and R. K. Hanson, Show Director and Executive Secretary, for the success of the event.

Market development was a study that the President felt could be made a profitable major project of the Association for the

# STANDARD ★ ★ ★

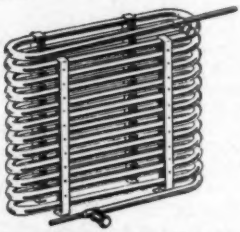
## Means... QUALITY to the REFRIGERATION INDUSTRY

A complete line of efficient heat transfer products for refrigeration manufacturers, contractors, and service engineers.



**MODEL J S EVAPORATORS**

Stainless steel with concealed thermostat mounting bracket back of full length door. Sizes for 4 to 12 cubic foot refrigerators.



**COUNTERFLOW CONDENSERS**

Full water coil surface permits maximum efficiency and greater capacity for minimum space requirements. Sizes ranging from ½ to 25 H.P. or larger.

**RECEIVERS**

All joints welded electrically for maximum strength. Tested to 300 per cent over normal working pressure.

**SHELL AND COIL CONDENSERS**

Designed with a high capacity finned copper water coil. Enclosed in an electrically welded steel shell. Capacities from ¼ to 3 H.P. Larger sizes on request.

*SOLD THROUGH LEADING REFRIGERATION WHOLESALERS*

# Standard Refrigeration Company

***20 NORTH WACKER DRIVE • • CHICAGO 6, ILLINOIS***

future. He thought that this study would be desirable as we approach a buyers' market.

In touching upon industry relationships, President Spoehrer stated that a survey indicated 80% of REMA's membership distributed through wholesalers. In furtherance of closer relationship between manufacturer and distributor, joint REMA-REWA conferences are again planned for either September or October, 1948.

## Officers—1947-1948

President—E. M. Flannery, Bush Mfg. Co., Hartford, Conn.

Vice-President—H. F. Hildreth, Westinghouse Electric Corp., Springfield, Mass.

Treasurer—R. H. Isreal, Virginia Smelting Co., West Norfolk, Va.

Secretary—K. B. Thorndike, Detroit Lubricator Co., Chicago, Ill.

### Directors

H. F. Hildreth, Springfield, Mass.

John Schlemmer, General Controls Co., Glendale, Calif.

G. M. Kingsland, Minneapolis-Honeywell Regulator Co., Minneapolis.

W. A. Siegfried, Superior Valve & Fittings Co., Pittsburgh.

E. M. Flannery, Hartford, Conn.

H. C. Morrison, Curtis Mfg. Co., St. Louis, Mo.

J. W. Krall, Tyler Fixture Co., Niles, Mich.

W. H. Maxwell, Calumet & Hecla Consolidated Copper Co., Detroit, Mich.

H. W. Jarrow, Jarrow Products, Chicago, Ill.

R. H. Isreal, West Norfolk, Va.

G. E. Graff, Ranco, Inc., Columbus, Ohio.

K. B. Thorndike, Chicago, Ill.

H. F. Spoehrer, Sporlan Valve Co., St. Louis, Mo.

In problems dealing purely with matters relating to the various product groups which comprise REMA membership which do not involve general association policy, he advised that the Board of Directors has adopted the ruling that each product group had autonomous powers in dealing directly with other agencies in such matters as standards, tests, etc.

He advised the membership that during the past year it was necessary for REMA to reaffirm the policy adopted some years ago requesting members not to display in state or sectional group exhibits puchasing program space, but to support only the All-Industry show.

In conclusion he acknowledged appreciation to officers, past presidents, and Executive Secretary R. K. Hanson for the splendid work they had contributed to furthering the success of REMA.

The Treasurer's report by Guy Henry, Chicago, indicated a most satisfactory condition of the treasury and a substantial increase in surplus over the preceding year.

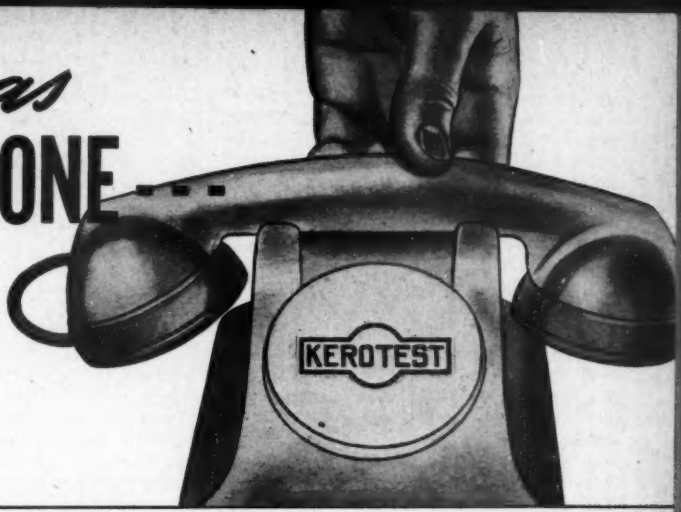
In the absence of F. J. Hood, Marinette, Wis., Chairman of the 5th All-Industry show committee, J. A. Strachan, Cleveland, reported that exhibit floor plans were in the hands of all members, and that general

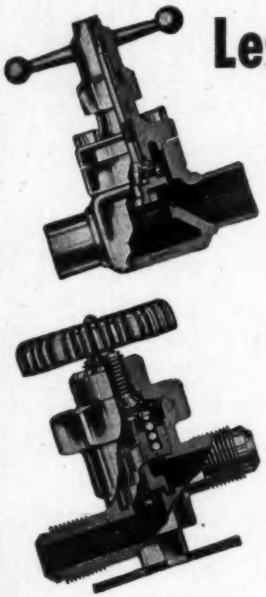
E. M. Flannery, vice-president of the Bush Manufacturing Co., Hartford, Conn., newly elected president of the Refrigeration Equipment Manufacturers Association, shaking hands with the retiring REMA president, Herman F. Spoehrer, vice-president of the Sporlan Valve Co., St. Louis, Mo., shown on the right.

space sales, after selection by REMA members, would be offered some time in May. As of April 10th, 92 spaces by 57 REMA members has been reserved. He emphasized particularly that his committee was especially interested in improving the handling of housing facilities and reserving special days for wholesalers, servicemen, contractors and dealers, so as to permit these groups ample time to visit manufacturers' displays under most favorable conditions.

George J. Roche, Baltimore, Md., President of the Refrigeration Equipment Wholesalers Association, in his talk on "The Wholesaler Speaks" stated that Government statistics showed that wholesalers business of all kinds had increased from 55 billion in 1939 to over 100 billion in 1946, now exceed-

# *Close as* YOUR PHONE . . .



## Less Inventory Required!

RIGHT near you there's a man carrying a load for you—because it's *his* business. He's your Kerotest Wholesaler . . . whose ample stocks of Kerotest Quality Valves and Fittings are at your disposal so that you may have everything you need "on tap" . . . without the burdensome overhead of a private inventory.

Located everywhere . . . to serve all America . . . your Kerotest Wholesaler is as close as your 'phone. Look to him for time-saving, money-saving service regularly—for emergency service when needed—on Kerotest Quality Valves and Fittings for every Air Conditioning and Refrigeration need.

*See your* KEROTEST *Wholesaler*

KEROTEST MANUFACTURING CO.
PITTSBURGH, PA.

AMERICA'S FIRST NAME IN QUALITY VALVES

ing the published reports of the total of retail sales. He pointed out that legitimate wholesalers have not only provided a definite service to the public and manufacturer but have been instrumental in reducing distribution costs. Mr. Roche said that wholesalers have a particular advantage in that they know the requirements of their local markets.

C. A. MacArthur, Hartford, Conn., Chairman of REMA's Wholesaler Relations Committee, told the membership that numerous conferences had been held throughout the year with the wholesalers' committee and complimented them on the manner in which they have constructively offered their suggestions. He felt that this committee could be of considerable more value if the manufacturers would likewise present the things that they would like the wholesalers to do.

## Afternoon Session

The afternoon session was turned over to the consideration of "Merchandising and Marketing." President Spoehrer, in opening the program, stated that this vital subject is one that must be immediately considered and was undoubtedly in the forefront of the majority of the manufacturers promotional plans.

W. J. Stelpflug, Hussmann-Ligonier Co., St. Louis, pointed out in his paper "Why I am Interested in Export" the barriers encountered in doing business in foreign countries, but that in spite of these barriers he felt that the export market was of value to the American manufacturer because it could absorb surplus production which we may eventually have, and our products would contribute toward raising the living standard in other countries. He cautioned American exporters to be sincere in their dealings, and especially to avoid exploitation. It was his opinion that export business, handled properly, would be a potential factor in building a better world.

In addressing the members on "How to Plan Sales Meetings," W. W. Kemphert, Worthington Pump & Machinery Corp., Harrison, N.J., said, "The days when the fish jumped into the boat are over. There is no magic formulae to get customers," said Mr. Kemphert, "but only the old fashioned tried and proven method of 'dig and sell.'" He predicted that the manufacturers' major problem was to sell more at reduced sales costs. "The challenge of war was production and the challenge of peace is distribution," continued Mr. Kemphert. "Mass production must have mass distribution and as in sports, salesmen must be re-trained each year. This not only applies to new salesmen but old salesmen as well. You can always benefit from a refresher course."

Concluding the Merchandising and Marketing session, Vernon E. (Sam) Vining, Marketing Consultant, Westinghouse Electric Corp., Mansfield, Ohio, in a humorous and dynamic way told the members, "You Gotta Sell It, Too" with the emphasis on YOU. He considered the word "salesmen" a misnomer and felt that every salesman should be considered a business man. He advised the manufacturers that the biggest job they had through his "business man" was to teach distributors, dealers, wholesalers, servicemen and contractors how to make money. Training salesmen is not selling merchandise. Teach your "business salesman" he is selling people and not merchandise and lay emphasis on the fact that sales training is training in how to handle people and find out what people need.

Concluding the meeting, President-elect Flannery presented Retiring President and Mrs. Spoehrer a silver tea service from the association in appreciation of the leadership Mr. Spoehrer had provided REMA during the past year.

At the Thursday evening banquet, REMA formally introduced the new and retiring officers and directors.

S S S

## LIFE OF A COUNTER MAN

I work behind the counter
In a wholesalers store.
Sometimes I'm called a "genius."
Sometimes I'm called much more.
I claim I'm no mechanic,
Yet when the job goes sick,
The mechanic comes and asks me
What makes the damn thing tick.
I'm supposed to know the numbers
Of bolts and nuts and gears
For every refrigerator that was ever made
For more than forty years.
As an engineer and machinist,
And handy man, Ah, my Lord,
I'm supposed to be an Edison
Combined with Henry Ford.
But life would be a pleasure
And I'd grin from ear to ear,
If the customer would tell me
The MODEL, MAKE AND YEAR.

*Author unknown*

# NOW . . . a cold-box type "Serviceman"

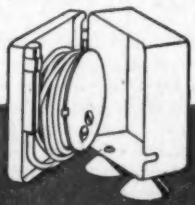

**RANGE**
**– 30° to**
**+ 65°!**

## *Marsh does it again . . . first!*

IT'S the celebrated Marsh "Serviceman" with range increased to match your ever-increasing work on quick freeze units. Yes, it now indicates from —30 to +65 degrees F. Along with this it has all the features of the original "Serviceman"—the same accuracy, same utility, same ability to tell you what's going on behind the closed door. Here is a "must" for your service kit.

**JAS. P. MARSH CORPORATION, 2057 Southport Avenue, Chicago 14, Illinois**

★ A heavy-duty precision movement, guaranteed accurate within one degree. Has Marsh "Recalibrator" to *keep* it accurate. Note hinged back containing bulb and 5 ft. of tubing slender enough to pass between refrigerator door and jamb. Suction cups prevent slipping and protect surfaces. The "Serviceman" is still available in ranges—10° F. to +100° F.



**MARSH**
*Refrigeration Instruments*

# NEWS and ACTIVITIES

**Announcements of the activities and educational work of the International Society and Local Chapters appear in this department.**

## COMING CONVENTIONS

**R.E.W.A. Midwest Meeting**
Place: Broadmoor Hotel
City: Colorado Springs, Colo.
Date: June 5, 6
Secretary: L. W. Krueger

**Alabama Association**
Place: Admiral Semmes Hotel
City: Mobile, Alabama
Date: October 17, 18
Chairman: T. O. Cooper, Harris Supply Co., Mobile, Ala.

**National Locker Convention**
Place: Municipal Auditorium
City: Kansas City, Mo.
Date: September 25, 26
Director: R. R. Farquar, 656 Insurance Bldg., Omaha, Neb.

**Illinois State Meeting**
Place: Baker Hotel
City: St. Charles, Ill.
Date: November 1, 2
Secretary: R. E. Saunders, 730 Towanda Ave., Bloomington, Ill.

**R.E.M.A.—All-Industry Exposition**
Place: Cleveland Public Auditorium
City: Cleveland, Ohio
Date: January 26-29, incl., 1948
Secretary: R. Kennedy Hanson, 1107 Clark Bldg., Pittsburgh, Pennsylvania

## NEW SEATTLE CHAPTER GROWS

THE first meeting of the Seattle Chapter was held January 22nd in Seattle. N. Schwartz acted as chairman with 32 men in attendance. Consideration was given to the formation of a chapter and O. C. Yates, International Director, was present to explain the aims and purposes of the Society. Temporary officers were elected as follows: O. C. Yates, *President;* Walter Pelkey, *1st Vice-President;* James Campbell, *2nd Vice-President;* Thomas Nadin, *Secretary;* William Davies, *Treasurer;* and Maurice Smith, *Chairman, Educational Committee.* The National Constitution was adopted as read and the vote to form a chapter in the city of Seattle was unanimous.

The second meeting was held February 4th with 47 men in attendance, 43 of whom signed a petition for charter. Working committees were appointed and a Board of Directors elected. The educational program of this meeting consisted of a talk by Phil. Philbrick on the elimination of oil traps in low temperature refrigeration.

The third meeting of March 4th included the motion picture "Principles of Refrigeration" and a discussion on expansion valves during the educational program.

At the fourth meeting, held April 1st, a motion picture on the operation of expansion valves, by L. O. Grauer of Detroit Lubricator Co., occupied the greater part of the meeting.

S S S

## ILLINOIS COMMITTEES MEET

FOLLOWING through with the decisions of the Illinois Association board of directors, several committees met at the Hotel Rodgers, Bloomington, Illinois, on February 23 to discuss plans. The committees at this meeting were: Educational, Convention Program and Officers Training.

The Educational Committee, headed by Harold Anderson of Joliet, and assisted by Ray Gregory, Bush Mfg. Company representative, Easton, and Francis Frazee, Westerlin and Campbell Co., Chicago, has some definite plans under way for establishing a better chapter educational program. Their plans include the available speakers from manufacturers and members within the chapters themselves.

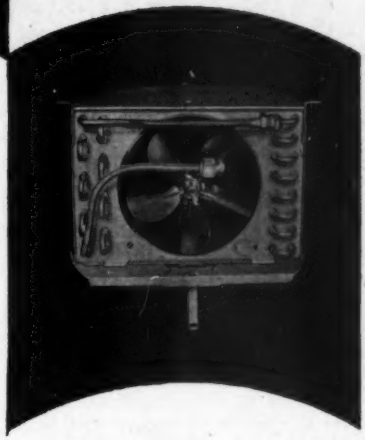
Two members having had recent experience as general convention chairmen are Dwight Orr, Chicago Seal Co., Chicago, and Ralph Porter, Illinois Association Treasurer, Bloomington. Under Dwight Orr's chairmanship the Convention Program committee is preparing a handbook covering details that must be handled before and during a state convention. This booklet will be a

# *The New* CURVETTE *by* KRAMER

**COMPACT**
Fan and motor are located out of sight, out of the way, inside the curve of the coils.

**ATTENTION-FREE**
Motor is permanently lubricated.

**ACCESSIBLE**
All connections are easily reached.



**GOOD-LOOKING**
Note the pleasing appearance of this neatly curved semi-circular unit.

**WELL-MADE**
Tubes are copper; fins and framework are aluminum.

**EFFICIENT**
Radial airflow assures uniform refrigerator temperatures.

**LOW PRICE**
Due to specialized, quantity production.

**PROMPT DELIVERY**

**FOR BEVERAGE COUNTERS, FOOD CHESTS, REACH-IN REFRIGERATORS, etc.**

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**KRAMER TRENTON CO.** Trenton 5, New Jersey

Pictured here are committee members of the Illinois State Association hard at work. Shown at top, left to right, are members of the Educational Committee: Ray Gregory, Bush Mfg. Co.; Harold Anderson (back to camera); Francis Frazee, Westerlin & Campbell, Chicago Chapter educational Chairman.

Center, left to right, members of the Convention Program Committee: Ralph Porter, Bloomington; Dwight Orr, Chicago Seal Co.

Bottom, left to right, members of the Officers Training Program Committee; Wm. McCarley (hidden); R. L. Hendrickson; Willis Stafford and Edmund G. Sperlin.

valuable aid to any chapter member when called on to act as the General Convention Chairman.

Feeling the need of some instruction program for chapter and state association officers for the benefit of present and future officers, the board of directors recommended a committee be appointed to develop an Officers Training Program. Headed by Willis Stafford of the Herman Goldberg Company and member of Tri-County Chapter, the committee formulated plans to prepare such a course. Mr. Stafford was assisted by Wm. McCarley, Metcalf's Refrigeration, Joliet; Edmund Sperlin, Cold-air Refrigerating and Air Conditioning Co., Bloomington; R. L. Hendrickson, Nickerson & Collins Co., Chicago. The committee feels that as officers become more familiar with their duties, the meetings will become more interesting and instructive. The committee is working toward a long range program which it is hoped will develop a supply of good officers for the chapters and, in turn, give the state association good officer material from year to year.

Meeting with the committees was John Sackey, President from Galesburg and Robert Saunders, Secretary, Bloomington.

S S S

## EUBANKS MOVES TO NEW QUARTERS

GORDON EUBANKS, who formerly operated his engineering and service business from his home, has recently moved to a downtown location where he can operate more efficiently.

He moved to Bloomington, Illinois, in 1942 as a member of the instruction staff for Commercial Trades Institute while training Army personnel in refrigeration. On completion of this assignment, he acquired the General Electric commercial franchise for that area.


Gordon Eubanks at the entrance to his new location in downtown Bloomington, Ill.

Having had some 30 years' experience with several of the large companies in building cold storage plants, coolers, and freezers, Mr. Eubanks entered the frozen food locker plant field and has designed and contracted for the building of several plants in or near Bloomington.

"A wide variety of applications for refrigeration equipment exists in Central Illinois and the special or uncommon requirements of several companies have been those that interested me most," says Eubanks.

Starting out as an ammonia and carbon dioxide man, he saw the greater possibilities in the low pressure field and has been doing work on both the large tonnage ammonia systems as well as low pressure commercial and air conditioning for many years.

# RSES International Educational and Examining Board Appointed

P. B. REED

H. D. BUSBY

J. L. ROSENMILLER

L. P. ROTH

A. L. SAWYER

A. M. SCHMITZ

J. H. SPENCE

W. O. WALKER

APPOINTED by W. W. Allison to the International Educational and Examining Board are these RSES members who comprise the committee under the chairmanship of Paul B. Reed, responsible for the international educational program.

While details of the expanded educational activities of the Society have not yet been worked out and cannot be announced, one of the immediate activities to be engaged in by the board is the writing of an All Makes Master Service Manual.

## Biography of Board Members

Paul B. Reed, graduate of Valparaiso and Indiana Universities, veteran of the United States Navy, World War I, where he served as radio operator, repairman and instructor of the then new wireless telephone, entered the refrigeration field as a Kelvinator dealer in Louisville, Ky. He served in successive

A. M. FENWICK

positions as Service Manager of Icenomor in Evansville, Ind., with Kelvinator and Superior dealers in Evansville as serviceman, then entered business for himself as electrical wiring contractor for about two years. He joined Servel in June, 1926, where he occupied the various positions of Service, Inspection and Field Service Engineer and later served in the office on service and application work. He was made Assistant Service Manager of the Electric Division in 1932, becoming Service Manager in 1936. He severed his connection with Servel in 1943 to take his present position as Man-

# Is the System WET or DRY?
# DON'T GUESS...KNOW!

## DFN MOISTURE INDICATOR

tells quickly...on the job, with laboratory accuracy

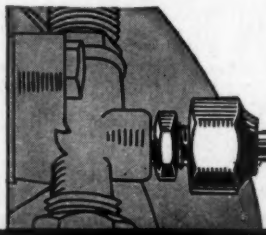
**Quick . . . simple . . . low-cost method of detecting moisture in Freon and Methyl Chloride Systems**

THE new DFN Moisture Indicator is a big time-and-money-saver on service calls—in the shop—on new installations. It tells quickly whether moisture is the cause of troubles and shutdowns—assures that a system is dry when you finish installation or servicing, to prevent call-backs.

The DFN Moisture Indicator is easily, quickly installed to gauge connection. The indicating cartridge (containing specially processed "Drierite") quickly tells the degree of moisture, if any. No need to shut down unit. Indicates accurately between 0° and 160° F. operating temperature. Packed in handy metal service kit. Ask your jobber for details—or write for literature and prices.

**To KEEP systems dry, use DFN DEHYDRATORS**

• 100% drying efficiency proved by repeated tests with DFN Moisture Indicator. Cartridge type—angle type—non-refillable type—hermetic system type.



*PAT. APP'L'D FOR

**McINTIRE CONNECTOR CO.**

Makers of DFN Dehydrators, Filters, Strainers

**255 Jefferson St.** **Newark 5, N. J.**

ager of the Refrigeration Controls Division, Perfex Corporation, Milwaukee, Wis.

He has been a member of the Refrigeration Service Engineers Society since 1936, serving as Chairman of the Wartime Educational Committee since 1942 and elected Chairman of the Educational Examining Board in 1946. During the war, Mr. Reed served on the National Service Manpower Training Committee, writing much of the Army service manual in addition to service manuals for various companies.

Harry D. Busby, Managing Editor of THE REFRIGERATION SERVICE ENGINEER, received his schooling in Western Canada, migrating to the United States in 1923. He entered refrigeration service work in 1925 with the Public Service Company of Northern Illinois, servicing the early Servel refrigerators. Later he was transferred to the general offices of the company where he had indirect supervision of field service throughout northern Illinois. In 1932 he entered business for himself as an independent service operator, taking over the service work which the Public Service Company had discontinued. He disposed of this business after four years to accept a position as Superintendent of Refrigeration for the Majestic Radio and Television Corp. until 1937. He was briefly employed in refrigeration experimental work just previous to his joining THE REFRIGERATION SERVICE ENGINEER in 1937.

He was a charter member of the Chicago Chapter, serving two terms of two years each as Secretary. He served as Acting International Secretary for a period of one year during the last war when the International Secretary was absent in the South Pacific.

J. L. Rosenmiller, Manager of the Accessory Equipment and Maintenance Department of York Corporation, York, Pa., is a graduate of Lehigh University. He was employed between 1920 and 1925 by the Empire Gas and Fuel Co., Bartlesville, Okla., in oil geology and oil refining work. This was followed with two years of work on the development of oils for the lubrication of refrigerating equipment, then in 1925 he became President of York Oil and Chemical Co. That company in 1927 was absorbed by the York Ice Machinery Corporation which is now the York Corporation. He remained with this company in the capacity of Manager of the Accessory Equipment and Supplies Division, later as Manager of the Sales Promotion Division and now as Manager of the Accessory Equipment and Maintenance Division.

Lawrence P. Roth, President, Refrigeration Service, Inc., Los Angeles, Calif., is a native of Owosso, Michigan, who migrated to the sunny climes of California in his early years. He is a graduate of California Institute of technology, with a degree B.S. in M.E. He had experience in the motion picture industry before entering the refrigeration field. In 1926 he was employed by Servel, Inc. as a Service Engineer in Oakland and San Francisco. In 1928 he entered the wholesaling business where he has remained since.

Albert F. Sawyer, Engineer, Dole Refrigerating Company, Chicago, Ill., is a graduate of Massachusetts Institute of Technology. He was in charge of an engineers' and firemen's school in the Quartermaster Department in World War I. In 1922 he entered the refrigeration field as Chief Engineer for Icemaster Co. in Massachusetts. He made many refrigerated truck installations beginning in 1925. In 1938 he affiliated with Dole Refrigerating Company, in the manufacture of vacuum plates.

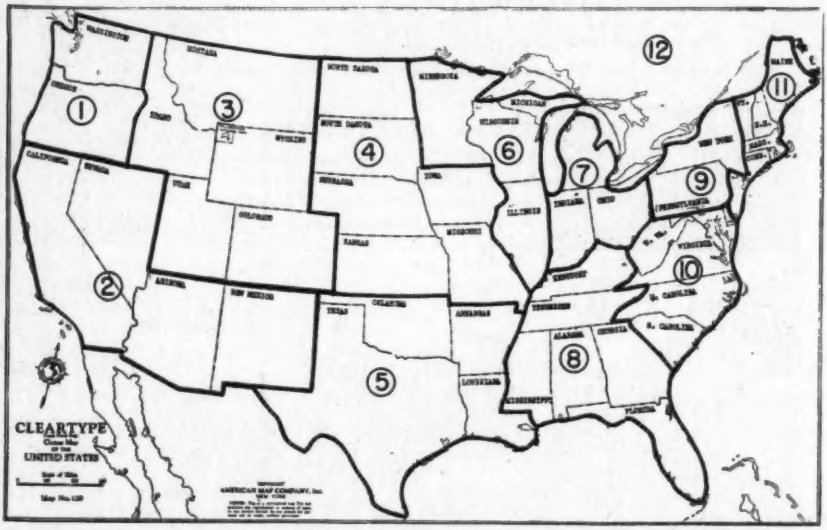
A. M. Schmitz, Manager of the Northeast District of the Electric Refrigeration Division, Servel, Inc., entered the refrigeration field in 1923 when he became associated with Copeland Products, Inc., Flint, Mich., as Field Service Engineer. He joined Servel, Inc., in 1926 and served in various divisions. In 1935 he became Eastern Engineer until his recent appointment as Manager of the Northeast District. Mr. Schmitz has had considerable experience in conducting refrigeration sales and service schools and has contributed materially to the development of engineering practices adopted by his company and their distributor accounts. He is well known among members of the eastern R.S.E.S. chapters for his instructive talks on sealed units and other subjects of timely interest.

J. H. Spence, Hussmann Refrigeration, Inc., St. Louis, Mo., entered the refrigeration business in 1928 as a dealer for Frigidaire Corporation. In 1931 he moved to St. Louis to work for the Westinghouse Distributor. He entered that company as District Supervisor and later became whole-

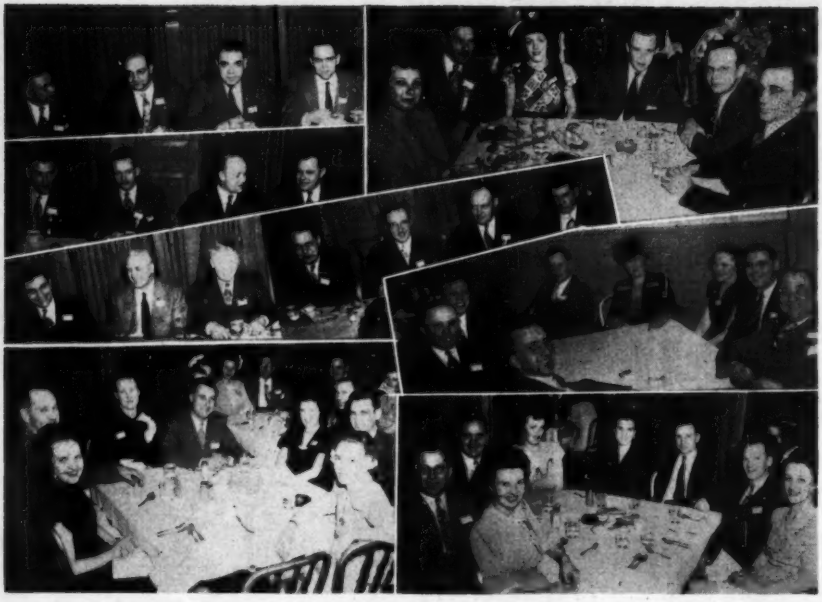
sale commercial Sales Manager for Southern Illinois and Southeastern Missouri. In 1933 he became Application Engineer and Service Manager. He left the Westinghouse Distributor in 1937 and entered the Sales Engineering Department of Hussmann-Ligonier Company, where he has remained until this date. He was Application Engineer for 2½ years, then became assistant to the Vice-President in charge of Manufacturing. In this position he organized the service department and later became the company's first Service Manager.

Dr. Walter O. Walker, Ansul Chemical Company, Marinette, Wis., after a long and distinguished career in the field of teaching chemistry, joined the Ansul Chemical Company as Director of Research and Development in 1936 and has made numerous investigations on the subject of moisture in refrigerating equipment, separation of wax from oil-refrigerant mixtures, and the determination of moisture in refrigerants, evaluation of and study of the methods of formation of sludges in refrigerating systems. He is the author of numerous articles in this field of work and in the field of chemistry in general. He is at the present time heading the Ansul research program designed to benefit the refrigeration industry in general.

A. M. Fenwick, a member of the Cleveland Chapter, is a past International Educational Chairman and past Chairman of the Educational Committee, Cleveland Chapter. He is at present Educational Director of the Buckeye State Association. He has been an active member of the Society for many years, taking an active interest in the promotion of educational work.




The map above divided into 12 districts shows the territorial jurisdiction of R.S.E.S. directors. The directors responsible for each are: District (1) O. C. Yates, International Director, 1607 33rd Ave., Seattle 22, Wash. (2) W. W. Allison, International President, 1849 Florence Ave., Los Angeles 44, Calif. (3) J. L. Driskell, Sergeant-at-Arms, 236 No. Almo Avenue, Burley, Idaho. (4) C. J. Doyle, International Treasurer, 4339 California St., Omaha 3, Nebr. (5) T. L. Burroughs, International Director, 2507 Capital Ave., Houston 3, Texas. (6) A. L. Robertson, International Director, 409 Walton Place, Madison, Wis. (7) Earl Yockey, International Director, 209 Hinman Ave., Columbus 7, Ohio. (8) C. S. Tucker, International Director, 1537 Bay Ave. S.W., Birmingham, Ala. (9) William Marshall, International 1st Vice-President, 1880 Yonge St., Toronto, Ont., Can. (10) Walter E. Booth, International Director, 1831 Broad St., Richmond 20, Va. (11) Charles C. E. Harris, International 2nd Vice-President, 2044 Massachusetts Ave., Cambridge 40, Mass. (12) Interprovincial Association; William Marshall, International 1st Vice-President, 1880 Yonge St., Toronto, Ont., Can.; Napoleon Brossoit, International Director, 1129 Notre Dame W., Verdun, Que., Can.



**Views of the Wisconsin State Association meeting held recently in Milwaukee, Wis. A complete report of the meeting was contained in the April issue.**

*Photos by Irving Alter*

## Chapter Notes

● ARROWHEAD CHAPTER, *Riverside, Calif., Mar. 31*—W. W. Allison, International President, presented the charter to the chapter with R. Zimmer, President, accepting. There were a number of visitors from Los Angeles, Long Beach, Pasadena and Palm Springs in attendance. Coffee and refreshments were served through the courtesy of Herb Kaeding, 1st Vice-President. William Irving, one of the visitors, spoke on the proposed educational program of the California State Association, and Mr. Allison gave some details of the State Convention to be held the latter part of April. Messrs. Frazier and Kaeding were elected as delegates to the State Convention.

*April 14*—A large part of the meeting was devoted to business which included the appointment of working committees, the consideration of proposed By-Laws and other formation work before the chapter. On the educational program, Carlton Ricker presented films of an entertaining nature.

● BOSTON CHAPTER, *Boston, Mass., Mar. 11*—Charlie Harris was the speaker of the evening, coupled with a very interesting demonstration on how to increase the efficiency of a vacuum pump with the use of refrigeration. The members displayed a great deal of interest in this demonstration, expressing the opinion that they had received valuable information out of it. Four new members were accepted during the business session.

● CALGARY CHAPTER, *Calgary, Alberta, Can., Mar. 28*—The installation of officers was one of the first orders of business with President Dowling presiding. In addition to the President, the new officers are: E. W. Howes, *2nd Vice-President;* J. E. McKenzie, *Secretary;* E. J. Gush, *Treasurer;* and H. E. Turner, *Sergeant-at-Arms*. D. Patterson gave an interesting talk on Kelvinator equipment, stressing the trend toward sealed units.

● CENTRAL CONNECTICUT CHAPTER, *Hartford, Conn., Mar. 31*—Speakers of the evening were M. J. Meiklejohn of McIntire Connector Co., who gave a very informative talk on the subject "Refrigeration with a Hangover," and Jack Carroll of Davison Chemical Corp. on the subject of "Removal of Moisture." H. A. Chandler wound up the educational session with a demonstration of the new moisture indicator. The three speakers then formed a Board of Experts, answering the many questions from the floor. It was a very successful and educational evening, occupying nearly the entire meeting. The meeting wound up with the showing of a film entitled "Yesterday, Today and Tomorrow" which was both entertaining and informative.

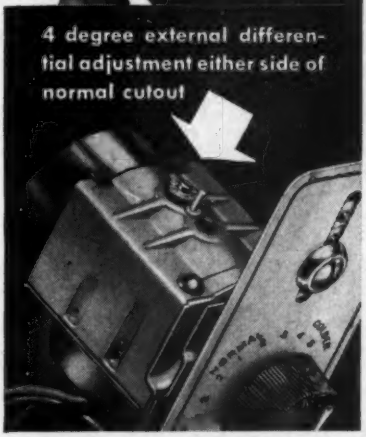
● CENTRAL NEW YORK CHAPTER, *Syracuse, N. Y., Mar. 11*—The business meeting was occupied mainly by discussion on a forthcoming banquet, and movies on current

# ALL NEEDED CONTROLS

## FOUND IN THE CUTLER-HAMMER REFRIGERATION REPLACEMENT LINE

Sixty percent of all refrigeration control replacement requirements are met by one Cutler-Hammer control alone . . . the *Universal* Replacement Unit. And where specific control is needed, that need is met by Exact Replacement control items in the C-H line, each individually packed, clearly labelled, complete with dial plate mounting screws, trim washers and full instructions for mounting and adjustment.

The practical advantages gained are: less capital tied up in stock; rapid and regular turnover; speedier completion of each job; greater all-round satisfaction. And in each C-H Replacement unit you will find the results of a 50-year specialization that had led to acknowledged leadership in the control field. Thus, outstanding refrigeration wholesalers recommend C-H Replacement Control and alert service organizations everywhere feature and use it. CUTLER-HAMMER, Inc., 1363 St. Paul Ave., Milwaukee 1, Wisconsin.

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**THIS ONE UNIVERSAL UNIT ALONE COVERS 60% OF ALL NEEDS**

**ADJUSTABLE MOUNTING BRACKETS**

***Maximum Mounting Centers*** **. . . . 4-3/16**

***Minimum Mounting Centers*** **. . . . . 2-3/16**

Adjustable Cutout Feature—Differential can be increased 4 degrees by turning indicator in "Hi" direction and decreased 4 degrees by turning in "Lo" direction.

Adjustable Range—Turning screw clockwise lowers setting and counter-clockwise raises settings.

Operating knob can be adjusted to meet various evaporator scale settings. New knob is ideal for varying shield thicknesses. Makes *this* control adaptable to wider range of single dial replacement jobs where overload is not required in unit.

CUTLER-HAMMER
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**DOMESTIC, SEMI-COMMERCIAL AND COMMERCIAL CONTROL**

events during 1946 provided the entertainment. On April 8th the meeting was devoted entirely to business.

● CHICAGO CHAPTER, *Chicago, Ill., Apr. 15*—The educational program of the evening consisted of a talk by Joe Askin, Chief Engineer of Peerless of America, Inc., on the very enlightening subjects of cooling coils, cold plates and other evaporative surfaces, how to figure heat loads, balancing systems, and general application data.

● CLEVELAND CHAPTER, *Cleveland, Ohio, Mar. 8*—This was the night of the chapter's anniversary dinner dance. Dick Hollingsworth and his entertainment committee provided a program that was enjoyed by all. A steak dinner, and a good one, caused everyone to be in quite a restful mood as Dick Hollingsworth introduced guests from the Youngstown, Akron, Medina and Columbus Chapters who, in turn, presented their wives. Orra Nichols, Jr., President of the Buckeye State Association, spoke on the success made in the recent formation of the association and declared this was due to the excellent inter-chapter relations existing in Ohio. Warren W. Farr, President of N.A.R.C. and a past national director of the Society, reminded the RSES members of the close relation that exists between the two organizations and expressed that in the future some activities may be held jointly.

The retiring president, Paul Spring, who had served a two year term, was quite surprised when Dick Hollingsworth presented him with a beautiful gold pin given him by the chapter. The final phase of the program followed as the orchestra filed in and played a few song hits with everyone participating in the singing, then swung into the dance music. The elder as well as the youngsters danced together through number after number. One o'clock found the "die-hards" leaving a full and satisfying evening.

● COLONELS CHAPTER, *Louisville, Ky., Mar. 20*—D. J. Gott, Detroit Lubricator Co., spoke on the subject of expansion valves. He started with a showing of motion pictures and slides and wound up with diagrams and graphs drawn on the blackboard to explain details of operation.

● DAYTON CHAPTER, *Dayton, Ohio, Mar. 27*—In a round table discussion, the subject of the amount of reserve to be set aside for maintenance of warranty service on new equipment drew considerable attention.

The April 10th meeting was held at the Allied Supply Co., with 50 servicemen in attendance. E. T. Simonson of the Hughes-Simonson Engineering Co. spoke on "Temperature and Humidity." It was a very interesting talk.

● DIRIGO CHAPTER, *Auburn, Me., Apr. 8*—A quiz contest was conducted by Clayton E. Canning, with the meeting being divided into two groups who alternately answered questions. Ten points were allowed for each correct answer, with the judges' decision being accepted as final. Much interest was developed during this contest and many educational problems settled.

● FOX VALLEY CHAPTER, *Fond du Lac, Wis., Apr. 2*—A short film entitled "The Effects of Methyl on Aluminum" was shown on the educational program for the evening.

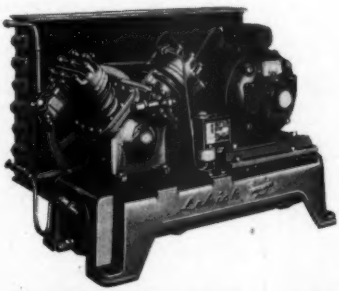
● HEAD OF THE LAKES CHAPTER, *Duluth, Minn., Feb. 3*—A movie entitled "Adjusting Expansion Valves" provided the educational program. The meeting was preceded by an informal dinner.

Members of the Montreal Chapter in Canada recently gave a dinner party at the Latin Quarter in Montreal for some of the Canadian jobbers and American manufacturers. Pictured at the dinner in the above they are, left to right: W. M. Maybe, Windsor, Ont.; C. Heilig, Air Coils, Ltd., Oakville, Ont.; B. Nye, Superior Refrigeration, Toronto; T. Plouff, Ansul Chemical, Marinette, Wis.; J. L. St. Amour, Ottawa, Ont.; W. Nye, Superior Refrigeration, Toronto; M. B. Madden, Electrimatic, Chicago, Ill.; M. L. Monson, Mills Industries, Chicago; B. Beidler, Ansul Chemical, Philadelphia, Pa.; H. M. Milne, Modern Household Appliances, Montreal; G. Forget, Rema Refrigeration Mart, Ltd., Montreal; A. G. Small, Western Agencies, Ltd., Vancouver, B. C.; R. Brault, Airco Refrigeration Parts, Montreal; G. Ouellette, Rema Refrigeration Mart, Montreal.


# "Howdy—Men!"

## We are the LEHIGH TEAM

Lehigh BLU-COLD COMMERCIAL REFRIGERATION



You've probably heard a lot about us—and if you get around much you've seen a lot of BLU-COLD units in operation. So it's time we got better acquainted.

BLU-COLD users are telling us that it is one of the most dependable and satisfactory units on the market—and by far the *easiest to service.*

There are two good reasons for that:

1. **PARTS ARE INTERCHANGEABLE THROUGHOUT THE LINE.**
2. **EVERY DETAIL, FROM FLYWHEEL TO VALVE PLATE, IS DESIGNED WITH EASY SERVICING IN MIND.**

Right now we are delivering ¼ to 1 H.P. models. Very shortly we will complete the line up to 5 H.P. So we repeat—let's get to know each other better. Send in your name and address so we can put you on our mailing list.

# Lehigh BLU-COLD

## HEAVY DUTY CONDENSING UNITS

Manufactured By

*Lehigh Manufacturing Co.*

Plant—LANCASTER, PENNA.

● INDIANAPOLIS CHAPTER, *Indianapolis, Ind., Mar. 25*—Mr. Salter, Acting President of the chapter, turned the meeting over to the Educational Chairman who in turn introduced representatives of the Tenny Engineering, Inc. These gentlemen gave a demonstration of the Tenny expansion valve. The evening was wound up by refreshments furnished by Tenny Engineering.

● JOPLIN CHAPTER, *Joplin, Mo., Apr. 9*—Richard Myer, representative of the Alco Valve Co. of St. Louis, gave a demonstration and discussion with an Alco glass evaporator on how "Freon" looks going through the evaporator, how oil mixes with "Freon," the difference between "Top Feed" and "Bottom Feed" and what happens when a slug of liquid reaches the bulb of the expansion valve. He also discussed other equipment as manufactured by Alco Valve Co. An open discussion was held.

● LA CROSSE CHAPTER, *La Crosse, Wis., Mar. 7*—The educational film "Adjusting and Checking the Expansion Valve" and another film secured from the Detroit Lubricator Co., provided the program for the evening. On April 11th the film entitled "Checking and Replacing a Float Valve" was shown.

● LIMA CHAPTER, *Lima, Ohio, Mar. 20*—Frank Carter and Mr. Boucher of the Detroit Lubricator Co. gave an instructive talk on expansion valves, covering all types of expansion valve applications, general refrigeration, manufacturing and service problems. A tour was then made of the air conditioning and refrigeration equipment installed in the new Elks building where the meeting was being held. This installation was made by the Sweeney Engineering Co.

● MADISON CHAPTER, *Madison, Wis., Mar. 6*—President Lee Miles conducted the meeting which consisted of business only. Paul Reed then conducted an examination for certificate membership.

● METROPOLITAN NEW YORK CHAPTER, *New York, N. Y., Mar. 28*—Mr. Strong of General Electric Co. was the speaker of the evening on the subject "Removing Moisture from Refrigeration Systems." In discussing various methods, Mr. Strong explained the effects of moisture on systems, compared various types of dehydrators and suggested the use of vacuum pumps as the best method of removal. He then spoke of the future of the refrigeration industry, giving as examples some of the new applications in the industrial field.

● MILWAUKEE CHAPTER, *Milwaukee, Wis., Apr. 1*—Messrs. Page and McKee of Detroit Lubricator Co. provided the educational program with slides and wire recordings on Detroit Lubricator's expansion valves. Paul Reed then conducted a vote on the questionnaire sent out by the International Educational Committee to determine the interests of the membership in programs of the future.

● MONUMENTAL CHAPTER, *Baltimore, Md., Mar. 11*—George Boepple of Alco Valve Co. talked on the subject of "Expansion Valves and Solenoid Valves." He illustrated his talk with sketches and followed it with a general discussion which included questions from the floor.

● NIAGARA FRONTIER CHAPTER, *Buffalo, N. Y., Mar. 14*—Mr. Lowell of Frigidaire Division of General Motors Corporation gave an interesting talk on frozen foods, illustrated with colored movies. A luncheon, provided by Frigidaire, was served following the meeting.

● PENINSULA CHAPTER, *Newport News, Va., Apr. 10*—George Y. Wilson of Stangard Dickerson Co. gave a talk on cold plates, their applications and construction. In explaining the construction of plates, he stated they can be made as long as 12 feet in one section and will stand pressures of 200 pounds per square inch. The plates can be constructed to any desired shape to fit the particular application. He gave much of the technical data on capacities for both "Freon" and methyl chloride.

● PITTSBURGH CHAPTER, *Pittsburgh, Pa., Mar. 28*—J. H. Spence, Service Manager of Hussmann Refrigeration, Inc., was the speaker of the evening on the subject of modern trends in food merchandising and the development of food merchandising equipment. Motion pictures and slides were utilized by Mr. Spence to illustrate his story.

● ROCHESTER CHAPTER, *Rochester, N. Y., Mar. 12*—The educational film on refrigeration theory opened the educational program. This was followed by a talk on General Electric DR, CA and CF refrigerating machines given by Art Snyder.

At the April 9th meeting, John Eggleston presented three motion pictures, the first of which was on the national air races, prepared by Weatherhead Co., and the next two were part of the educational series of the Society.

● SACRAMENTO VALLEY CHAPTER, *Sacramento, Calif.*—The March 6th and April 3rd meetings were devoted entirely to business with no educational programs being reported.

● ST. LOUIS CHAPTER, *St. Louis, Mo., Mar. 25*—Sam Wolff had secured one hundred copies of an engineering manual on thermostatic expansion valves from Sporlan Valve Co. He distributed them during the meeting. B. C. Lindemann gave a talk on Nu-Coil and distributed literature concerning his product.

● SAN DIEGO CHAPTER, *San Diego, Calif., Feb. 20*—Paul Domke, Mueller Brass Co., gave a lecture and demonstration on sweat fittings and making soldered joints. Various types of solders were discussed and the effects of oxidizing on metals. Many of the members tried their hands at making sweat joints which added much to the interest of the program.

● SOUTHERN TIER CHAPTER, *Elmira, N. Y., Mar. 20*—This meeting was devoted to the installation of officers and presentation of the chapter's charter by Charles C. E. Harris, International Director. Mr. Harris

**These views were taken at the annual Fish Fry of the Toledo Chapter held April 18, in Toledo, Ohio. Austin Jones is the photographer.**

opened his talk with a reading of the purposes and objectives of the Society, followed by a little pep talk on the possibilities of membership.

● SUNSHINE CITY CHAPTER, *St. Petersburg, Fla., Mar. 18*—After the usual business session, the meeting was turned over to S. C. Petty, Chairman of the Educational Committee, who gave an excellent discussion on expansion valves, based on the bulletin "Recent Developments in Thermostatic Expansion Valves," written by Monroe Seligman.

● TRI-COUNTY CHAPTER, *Aurora, Ill., Apr. 19*—A feature of this evening was the initiation ceremonies conducted by Harold Anderson's committee. Candidates for membership were conducted to the electric chair and a series of questions on refrigeration were put to them—the hot spot of the period being reached when the questions got around to motors and voltages. The men were then blindfolded through a tour in stocking feet through a gauntlet of vicious looking rat and mouse traps. The traps were all sprung but fortunately no one was hurt. The obligation was then administered by President Ralph May.

● TRI-STATE CHAPTER, *Huntington, W. Va., Mar. 11*—The entire meeting was devoted to business, with the President appointing several working committees.

● WESTERN MASSACHUSETTS CHAPTER, *Springfield, Mass., Mar. 25*—A discussion on electrical wiring, what had to be done in case of a large unit installation and what could not be done by refrigeration men, opened the educational program. Two motion pictures followed to complete the evening.

● WOLVERINE CHAPTER, *Lansing, Mich., Apr. 14*—Leonard Wright, Field Representative, and Bill Meyer, Engineer, Alco Valve Co., presented an interesting lecture and display on a glass evaporator. Coffee and doughnuts wound up the evening.

## LADIES' AUXILIARY

● KANSAS CITY AUXILIARY, *Kansas City, Mo., Mar. 20*—Mrs. Taylor gave a report on the activities of the Mutual Help Institute at Manual High School, stating they need helpers who are handy with needles. Mrs. Shirley volunteered to provide the raffle gift for the next meeting, and the gift for this meeting was won by Mrs. Ferguson.

● TRI-STATE AUXILIARY, *Huntington, W. Va., Apr. 8*—The ladies met at the home of Mrs. A. W. Albertsen and were immediately served a very enjoyable supper along with the members of the men's chapter. The men left for their meeting and the ladies proceeded with business of the evening. As entertainment for the meeting, several interesting articles were read by the members.

S S S

## NARC ACTIVITIES

THE refrigeration contractors association of Seattle, Wash., and the Inland Empire association of Spokane, Wash., have joined forces to form the Refrigeration Contractors Association of the State of Washington. Headquarters are in Seattle, and in charge of Executive-Secretary Arthur M. Carney.

The new group starts with forty members, and has affiliated with the National Association of Refrigeration Contractors.

# STOP TERMINAL LEAKS!

## on all sealed units in 5 minutes—with WATSCO REPLACEMENT TERMINALS


**$5.50 PER SET**
**(3 terminals)**
**ORDER FROM YOUR JOBBER BY NUMBER**

You can now repair terminal leaks on sealed units easily, quickly, profitably. Instead of 6 or 7 hours—5 minutes! Instead of removing the unit—work right on the job! Instead of welding and machining, use only ratchet wrench or pliers!

The remarkable WATSCO REPLACEMENT TERMINAL screws right over the original terminal post—seals the unit *instantly and permanently!*

**#1** —for Crosley F-12 Unit

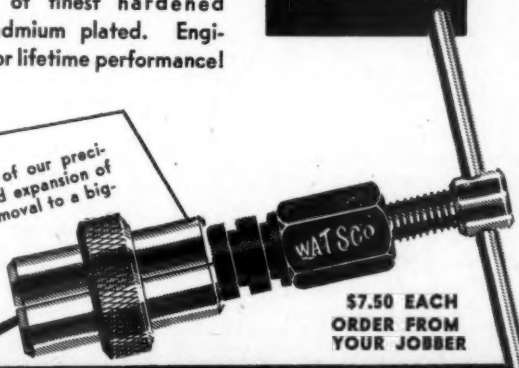
**#2** —for Frigidaire—up to and including 1937

**#3** —for Kelvinator, Norge, Westinghouse, Chieftian, Tecumseh, Philco

## —and here's the new, Lifetime WATSCO OIL RING PULLER

Removes the stubbornest oil ring in a jiffy! Cannot mar or damage ring or shaft. A quality precision tool —made of finest hardened steel, cadmium plated. Engineered for lifetime performance!

**THANKS, FRIENDS!**
Your volume purchases of our precision products has required expansion of our organization—and removal to a bigger and most completely tooled plant.
Formerly Wagner Products Co.




**$7.50 EACH**
**ORDER FROM YOUR JOBBER**

**WAGNER TOOL & SUPPLY CORP.**
1308 43rd Avenue, Long Island City, N.Y.

James Lessard, Automatic Refrigeration Co., Seattle, is president; S. F. Thomas, W. E. Stone Co., Seattle, is secretary-treasurer.

Five regions have been set up in the state with a regular monthly meeting scheduled for each. Regional directors are as follows:

Seattle Region: C. L. Quinn, Puget Sound Refrigeration Co., Seattle; and F. L. Van Winkle, Tacoma Refrigeration Co., Tacoma.

Chehalis Region: Fred Cheatham, Cheatham & Carter, Olympia; and William Vogel, Coastal Refrigeration, Chehalis.

Wenatchee Region: John Lavender, Lavender Refrigeration Co., Wenatchee, and Clifford Ruxton, Ruxton's, Inc., Yakima.

Walla Walla Region; K. G. Bentley, Bentley's, Walla Walla; and Tom Morrison, Empire Electric Co., Pasco.

Spokane Region: Ed Matthews, Electro-Kold Refrigeration, Spokane. The second director will be appointed soon.

The first all-state meeting will be a full one-day affair in Seattle, Saturday, June 14, winding up with a dinner-dance in the evening. The principal speakers will be Warren W. Farr, president, National Association of Refrigeration Contractors, Cleveland, and Paul B. Reed, Perfex Corp., Milwaukee.

## Florida Cities Organize

Twenty refrigeration contractors of Tampa and St. Petersburg, Florida, met recently in Tampa with Warren W. Farr, to discuss co-operation through an area association affiliated with NARC.

The meeting was arranged and presided over by H. B. Adams, refrigeration contractor of Tampa.

Subjects of particular importance to those present were unfair trade practices by some jobbers and dairy, ice cream and beverage firms; Freon shortages; and the need of a refrigeration code with provisions for licensing, permits and inspections.

Another meeting will be held soon to form the organization and elect officers and directors.

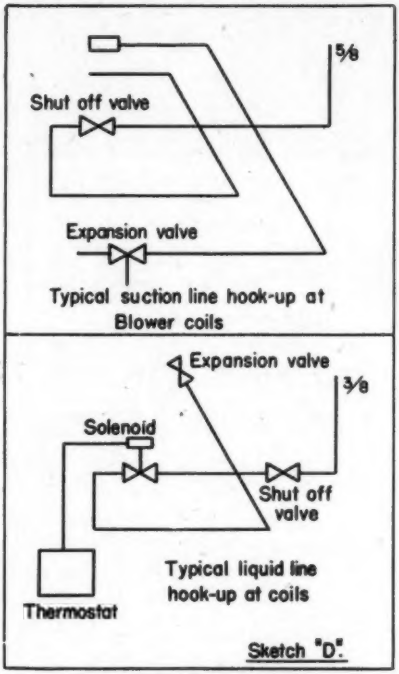
✕ ✕ ✕

## ESTIMATING

*(Continued from page 51)*

the price for each item. Some of the material will come from stock and you will know your price on those. Then either send or take your material list to your supply house to get corrections on the prices and to find out if they can supply the material. (Under no condition should you take the prices for granted. Always check with your supplier.) After you have checked prices with your supply house you can make the necessary corrections on the original copy of the estimate sheets and you are ready to send in your order if you should get the job.

The next step is to get prices for any part of the work that must be sub-let. In most cases the electrical work must be done by a licensed electrician, and few refrigeration contractors are equipped to do cement work. When you have received the bids from the sub-contractor and have agreed with him on a price the usual custom is to add 10% to his bill to cover your handling costs. Another point that should not be overlooked is permits. Many cities require a building permit and a fire permit before a new installation can be made, or alterations done on an existing plant. Usually the cost of these permits




Simple sketch of coil hookups.

is nominal and can be charged off to incidentals.

Now you have all the necessary facts and figures. It would be advisable to have someone check your figures. You may have forgotten the compressor or some other equally important item. Don't laugh. It has been done and I wouldn't have to go very far to kick a guy that has done it. I once knew a man who figured the refrigeration and air conditioning work on a large industrial building. He was low bidder on the job and was congratulating himself, until someone happened to notice that he had forgotten to figure 32 self-contained drinking fountains that were scattered around the buildings and

grounds. Fortunately the bids were thrown out on a technicality and he didn't get stuck. But the shock was too much for him. He quit the refrigeration business and now operates a chicken ranch. (With eggs at their present price it was probably a blessing in disguise.)

Now comes that part of estimating that has caused more arguments than the single standard, the eight hour law, and votes for women all wrapped into one—profit and mark-up on material and the amount of labor required to do a job. Some contractors use one method, some another, and all of them have their pet estimating percentages based on facts and figures that are peculiar to their particular business. But remember one thing. Except in rare instances—there is no use doing a job if you can't make money on it. We will deal with this phase of estimating next month.

S S S

## KELVINATOR AND LEONARD

*(Continued from page 43)*

cooling unit and a check on operating time. A shortage of refrigerant will result in long running time and the frost line on the cooling unit will be low. A high cut-in point on the temperature control will, of course, cause a low frost line. It would be advisable to check the cut-in and cut-out point of the thermostat by means of a dial thermometer with its bulb clamped beside the temperature control bulb before deciding on the cause of a low frost line.

**(To be Continued)**

S S S

## ABOUT FOODS

*(Continued from page 36)*

hydrated vegetables are held under refrigeration, they retain their quality wonderfully well. For some reason, even the packers of those dehydrated vegetables seem unwilling to put them under refrigeration; because of that, they are held at room temperatures and in about three or four or five months the quality becomes relatively poor. If left on the grocery shelves and then sold to the public, the quality is so poor that the average housewife has turned up her nose at dehydrated vegetables. Actually, if she had been sold dehydrated vegetables that had been under refrigeration, she would have been as well pleased with those products as with the frozen product. That is making a big statement. I suppose some people will disagree with me. Since I worked with dehydrated fruits and vegetables for about five years, I am sure that this is true. The unpopularity of certain dehydrated foods is mainly because of deterioration at high temperature.

Canned foods should be held under refrigeration. Again, I suppose some canners will oppose that, but I was at the New York Experiment Station at Geneva where we studied canned fruit juices and other canned foods, some of which were held through the summer under refrigeration and some in an ordinary warehouse. In the autumn we examined the two and there was no comparison in quality. Those we held under refrigeration were as good as the day they were packed and those that had stood through summer at ordinary temperatures were already definitely inferior. It is true, they were still edible, still possibly satisfactory, but the grade had dropped from something like a fancy brand down to a very inferior product. I hope that in the future, packers of canned food will hold their product under refrigeration.

### Dairy Products

Even at 32 F. fresh milk and cream cannot be kept longer than a few days. Evaporated and condensed milk should be held under refrigeration, preferably around 32 F. but should not be permitted to freeze.

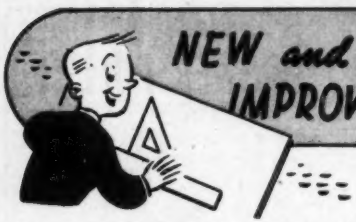
Butter can be satisfactorily stored for periods up to a month at 32 F. For longer storage periods, it should be placed in a freezer.

### Eggs

Eggs should be gathered frequently and then promptly cooled to 31 F. The optimum storage temperature is 30 to 31 F. with a relative humidity of about 90%. Under higher humidities there is great danger of mold growth. If higher humidities are used, it will also be necessary to use some ozone in the rooms, otherwise the eggs may mold. If relative humidities under 85% are maintained in the egg storage room the eggs will lose weight rapidly and the air cells will enlarge, resulting in loss of grade.

I can remember the day when I was a boy when everybody poked fun at cold storage eggs, and further, that the farmers never thought of holding eggs in a cooler or refrigerator. That time has changed and now everyone knows that eggs must be held in a cooler just as butter must be held in a cooler, if you are to hold the quality of the eggs. Today, the average person cannot tell the difference between a cold storage egg and a freshly laid egg. Certainly that is a far cry from what was the case 25 years ago. The difference is refrigeration from the time the egg is laid until it is put on the table in the hotel or home.

**(To be Continued)**

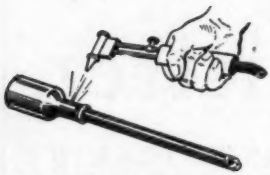


# NEW and IMPROVED EQUIPMENT

Information contained in this department is furnished by the manufacturer of the article described and is not to be construed as the opinion of the Editor.

## Silver Solder

A NEW, simplified, and economical method of supplying silver solder for the refrigeration trade has been announced by Wabash Manufacturing Company, 2642 S. Michigan Avenue, Chicago 16, Illinois.

This Wabash solder, which is easy-flowing and melts at 1145 F., contains 45% silver and is supplied in notched rings so that as needed single rings can be broken off the coil. Each ring contains sufficient solder to insure a perfect soldered joint, thereby eliminating the waste of excessive soldering. Wabash produces rings that will not expand when heated and due to their notching will slip with ease onto ends of tubes. These rings come in seven sizes to fit tubing that ranges from ¼" O.D. to 1" O.D. and are conveniently packaged in strong fiber boxes containing 100 rings for the small sizes and 50 rings for the larger sizes. Wabash furnishes complete self-explanatory instructions which insure excellent results in a minimum of time.

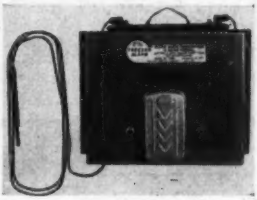
Also new on the market is the companion bottle of Wabash flux for silver soldering. A sturdy applicator brush is set right in the plastic cap of the bottle so that no flux is wasted or dried out by unnecessary exposure to air when not in use.

## Thermometer Clip

A NEW four-way thermometer attachment is made available by the Acme Products Co., San Antonio, Texas, manufacturers of the device. Its design, with two cells for the bulb of the thermometer, allows the user to place the thermometer either in a vertical or horizontal position in relation to the tube or pipe. Its flexible body will accommodate all curves of different size tubing and fits excellently on such shapes as flare nuts and other tube connections. The entire body is made of sterling silver for fast transfer. The attaching chain is long enough to accommodate up to 2" pipe diameter. With this attachment and his thermometer, the serviceman may make accurate temperature checks at any point of the system. The device is particularly useful where pressure gauges may be inconvenient or impossible to use.

## Freezer Alarm

A NEW thermostatic alarm for frozen food cabinets is being manufactured by Enterprise Products Company, Freeport, Ill. It is known as the FA-200 Freezer Alarm, contained in a wall mounted aluminum case housing a hydraulic actuated alarm thermostat, warning bell, test switch and battery. Six feet of capillary tube provide an extension under the freezer lid into the food compartment. The alarm has a fixed calibration to sound off when the temperature of the food compartment raises to 25 F. It is a battery powered alarm circuit, operating independently of the house circuit. System is complete in itself and can be installed readily without need for change in the freezer cabinet. It is shipped without the six volt ignition type dry battery, which must be supplied by the consumer.

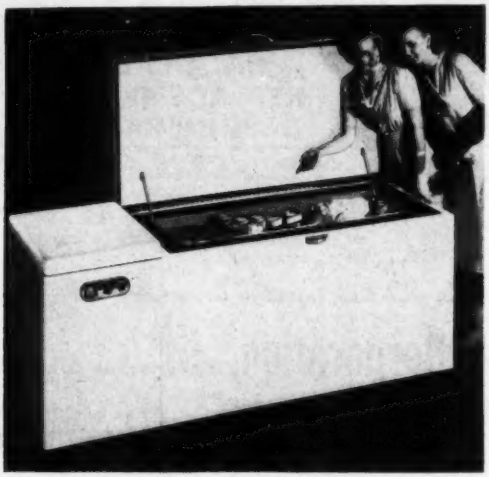


## Freezer

ILLUSTRATED is the new Harderfreez Farm and Home Freezer manufactured by the Harder Refrigerator Corporation, Cobleskill, New York, a subsidiary of the Tyler Fixture Corporation, Niles, Michigan.

The Harder Refrigerator Corporation was purchased by Tyler over a year ago, and is devoted exclusively to the manufacture of Home and Farm Freezers.

Tyler, the originator of the all welded steel commercial refrigerator, is employing the same hermetically sealed principle in their Harderfreez units, and the 1947 model has new added advantages.



The following new features are being stressed:

Freez Basket—a brightly finished rust-proof wire basket is being furnished as standard equipment. The basket will hold up to 50 pounds of food for processing.

Chrome plated instrument panel—has low temperature thermometer, red warning signal, and temperature control.

Wire compartment dividers—brightly finished wire dividers come as standard equipment. These wire dividers can be placed in the Harderfreez at any desired position, which permits easier storing of food.

Heavy chrome plated hardware—specially designed hardware is of the pressure lock type. Has no springs or gadgets to become worn. New hardware accommodates ordinary padlock.

E-Z Lift Top Cover—top cover on 1947 Harderfreez chest models opens easily and will stay in any position.

In addition to the above features, Harderfreez Farm and Home Freezers are hermetically sealed to eliminate infiltration of moisture. Sound engineering and months of research provide correct temperature and trouble free service. Freezers are rigidly constructed of welded steel inside and out.

## Vise

HERE is a new rugged Milling Machine Vise, the product of 30 years' experience in the manufacture of quality vises.

Palmgren Engineers designed this vise to meet demand for a popular priced, low-built, compact milling machine vise, equipped with a swivel base to afford quick, accurate set-ups at any radius within 360°.

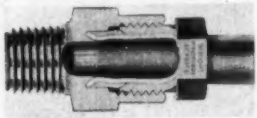
This milling machine vise is constructed low. It will resist tool pressure and vibration, save hours of set-up

time and minimize inaccuracy and rejections. The jaws are made of steel, one being grooved horizontally and vertically for holding round pieces. Swivel base is accurately graduated full 360 degrees and once set, it locks firmly into position.

## Coupling

REFRIGERATION engineers for years have striven to develop a permanent self-sealing coupling in the liquid gas line. They are now to be had in the desired types and sizes.

The Everseal self-flaring coupling meets the strictest specifications. It is the perfect coupling for both new and replacement work.



Demands for conservation of "freezing" fluids and gasses during the war, due to scarcity and high cost, created the necessity of leak proof couplings, which today are eliminating gas and liquid leakage.

Replacement of old couplings with the Everseal can be made where safety and conservation are a consideration.

## Selector

STERLING Tool Products Company, Chicago, manufacturers of portable electric sanders, announce the availability of a comprehensive slide rule type abrasive selector which is the result of more than three years of research into the problem of

proper abrasive selection for various sanding and finishing operations. This is the first time that a convenient graphic compilation of recommendations for the use of polishing agents has been offered.

Plastic coated for durability and designed in three colors for quick accurate reading, the new selector indicates the proper abrasive combinations for 120 specific sanding problems.

# News of the Equipment Industry

## TEAM FROM THE ARMED FORCES

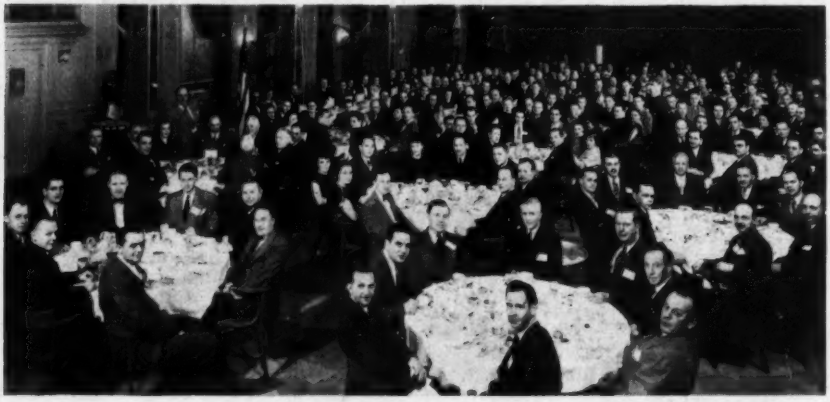
THE Brooke Co., Inc., 216 E. 3rd St, Davenport, Iowa, distributors for Trane and G.E. products, feels that it has a well trained personnel "recruited" from the Army, Navy and Air Force. J. O. Brooke, the owner, served as Lt. S.G. in the Navy. When he was discharged he started out to build his organization from other veterans. His organization now boasts of Bryce Sterne, Air Force Sgt., Lawrence Shearer, Army Sgt., Joe Russell, Navy Machinist Mate 1/c, and Kenneth Freeman, Navy Chief Petty Officer.

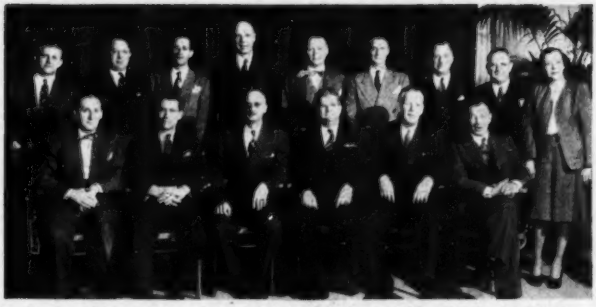
The company is handling commercial and air conditioning sales, service and installation in the Davenport area.

## MID-WEST WHOLESALERS MEETING

THE Mid-West Refrigeration Equipment Wholesalers Association will hold its Spring meeting at the Broadmoor Hotel, Colorado Springs, Colo., June 5 and 6. All members of REWA are invited to attend. Director H. R. McCombs and Chairman E. L. Tramposh are making elaborate preparations to make this meeting the outstanding event of the year. Those planning to attend should write the Broadmoor Hotel direct for reservations, giving arrival time.

Meeting and parties are scheduled for June 5 and 6. Saturday and Sunday are open for the enjoyment of the attendance. Features offered by the surrounding country are ice skating, golf, swimming, trips





Above—The past Presidents' dinner held during the REWA meeting of March 20 at the Edgewater Beach Hotel, Chicago.

Right—REWA officers and members of the board of directors. They are, left to right, front row: Ted I. Giou, Syracuse, Past President; Alex H. Holcombe, Jr., Philadelphia, Treasurer; J. F. Wickham, Lincoln, Nebr., Vice President; George J. Roche, Baltimore, President; R. L. Hinshaw, San Francisco, Secretary; Warren H. Parker, Greensboro, N. C., Director. Standing, left to right: Irving J. Fajans, New York City, Director; H. R. McCombs, Denver, Director; Joseph M. Mideke, Oklahoma City, Director; J. D. Ross, Montreal, Director; H. W. Holt, Pittsburgh, Director; Jack Glass, Chicago, Director; Edward C. Marsden, Hartford, Director; H. S. McCloud, Cincinnati, Executive Secretary; and Catherine Fisher, Asst. Secretary, REWA.

to Pikes Peak, Cheyenne Mountains, Cave of the Winds, and other mountain attractions. Arrangements are being made with the Western Air Lines for one or two DC-4 passenger planes from Colorado Springs to Los Angeles for those who plan on attending the A.S.R.E. convention June 9, 10, 11.

## CENTRAL PURCHASES BUILDING

THEODORE I. GLOU, president of Central Service Supply Company, has purchased the building which the company occupies at 647 S. Warren St. It is a two-story building with 13,000 square feet of floor space.

The company is a wholesaler of refrigeration parts and supplies and has opened new showrooms.

## CANADIAN ELECTRIC REFRIGERATION EQUIPMENT INCREASES

THERE was a sharp increase in the production of electric refrigeration equipment in Canada in 1946, the value being $13,762,000, or more than eight times the value recorded in 1945, according to figures released by the Dominion Bureau of Statistics. Domestic refrigeration units accounted for well over 60 per cent of the total value.

Production of complete domestic types totalled 56,786 units valued at $8,597,025 compared with 2,418 units valued at $355,225 in the preceding year. Production of commercial units, including "reach-in" boxes, condensing units, evaporators, finned coils, blower coils, milk coolers, etc. amounted in value to $5,164,518 compared with $1,244,841.

## R. A. MALARKEY JOINS SIMONS CO.

ROBERT A. Malarkey, formerly associated with Bush Mfg. Co., has joined Joseph Simons Co., refrigeration parts wholesaler, in a sales and engineering capacity, the company announces.

Mr. Malarkey, a graduate of New York university, was a field sales engineer for Sporlan Valve Co. prior to his association with Bush. Earlier, he handled sales and engineering for a refrigeration supply house.

The Simons organization serves Connecticut, western Massachusetts, and Vermont.

## TESCO OPENS NEW BRANCH

TESCO Distributors, Refrigeration Parts and Supply Jobbers of Newark, N. J., announced the opening, May 1st, of another branch store at 1614 Bergenline Ave., Union City, N. J. George Atkins will be Manager.

The main office and warehouse at 29-43 South Orange Ave., Newark has acquired additional space of five thousand feet to take care of the new expansion program now under way, pending the erection of a new building.

Ted Yecies advises that Jay Levins remains as Sales Manager and Sid Zackin as Purchasing and Newark Store Manager.

Fred Swanson is Manager of the branch at 54 Lafayette St., Paterson, N. J.

Tom Phillips has been appointed Dealers Relations Director, Paul Brokely and Vince Borrowdale as field men.

## MILLS PERSONNEL

DENNIS W. DONOHUE, Executive Vice-President, Mills Industries, Incorporated, announces, the promotions of the following men to key positions in the Company:

George B. Dardwin was appointed Vice-President in Charge of Factory Operations. He joined Mills 7 years ago as a sales engineer. During the war years he headed the Production Costs Department, and last year was promoted to the position of Plant Auditor.

Ferris D. Gaskill, Production Manager of Mills for 19 years, was appointed General Superintendent in Charge of Manufacturing.

Lewis A. Carroll, with Mills Cost Department for 14 years, has been appointed Chief Industrial Engineer.

Herbert Bendfelt, a Project Engineer with Mills for 8 years, has been appointed Chief Engineer.

## FRIGIDAIRE APPOINTMENTS

FIVE new sales management posts have been created within the Commercial Refrigeration Sales Department of Frigidaire Division of General Motors as an integral part of a current, nation-wide expansion program, W. F. Switzer, the Company's newly-appointed Commercial Sales Manager, has announced.

J. A. Smith, recognized as one of the foremost locker plant authorities in the country, has been promoted to Manager of Farm and Locker Market Sales. Air Conditioning Sales is being headed by C. F. Wood, a specialist with 16 years of practical

experience in his field. New Manager of Special Applications is G. A. Hayner, whose experimental work in the food refrigeration field has brought him national recognition. G. H. Ewing, who has been promoted to Manager of Case and Fixture Sales, has been associated with the Company for 16 years. L. E. Smith, is the new Manager of Water and Beverage Cooler Sales.

H. A. Beck, Manager of Ice Cream Cabinet Sales, and R. W. Pocock, Manager of National Business Sales, will continue to serve as head of their respective departments. A. C. Freimann, will also continue to serve as Assistant Commercial Sales Manager.

Two promotions in the Service Department of Frigidaire are also announced by H. F. Lehman, Assistant General Sales Manager.

E. E. Landis, Assistant Service Manager, has been promoted to Service Manager, succeeding Paul V. Sprout. Mr. Sprout has been appointed Branch Manager for the Frigidaire Corporation in Albany, N. Y.

H. E. Van Scoyk, who has been in charge of Service Technical, will continue to serve as Assistant Service Manager, but with broader responsibilities, Mr. Lehman explained. In addition to his regular duties, Mr. Van Scoyk will assume the responsibilities formerly handled by Mr. Landis.

"Mr. Landis has an intimate knowledge of our products, policies and organizational structure," stated Mr. Lehman. "He has a first-hand acquaintanceship with service problems—gained through years of practical experience and on-the-job training. He has been associated with Frigidaire for 19 years. Prior to 1928 he was employed in Dayton by Delco Products Division of General Motors. His appointment as Assistant Service Manager for Frigidaire followed in 1942."

Mr. Van Scoyk was also employed by Delco Products in Dayton prior to joining Frigidaire in 1929. He was appointed Assistant Service Manager in charge of the Technical Section in 1945 and has been serving in this capacity since that time.

* * *

## G. & E. NEW QUARTERS

G. & E. Equipment Supply now at 400 North Sangamon Street, Chicago, will move into their new quarters located at Ogden Avenue and Fulton Street on June 1.

G. & E. was established 17 years ago by Louis Escol and George Crossman, the present owners. The buying power and merchandising policies of the company have contributed to the rapid growth of their business.

Original company started with 1,000 sq. ft. floor space. Now they will, in their new location, utilize more than 20,000 sq. ft. Plans are to enlarge shipping facilities and provide still greater sales service. A newly appointed display salesroom is being completed for convenience of visiting customers.

* * *

## REIDER NEW SERVICE MANAGER FOR REYNOLDS METALS

R. E. REIDER has been appointed Service Manager of the Refrigeration Division at the Reynolds Metals Company, Louisville, Ky., it is announced by W. G. Reynolds, Vice President.

R. E. REIDER

Prior to joining Reynolds, Mr. Reider was with the Norge Division of the Borg-Warner Corporation for fourteen and a half years as Assistant to General Office Manager, Manager of the Service Parts Order Department, and finally as Assistant National Service Manager.

Mr. Reider is a native of Columbus, Ohio.

* * *

## ELECTRIMATIC APPOINTS REPRESENTATIVES EAST AND WEST

ELECTRIMATIC Products have recently received new and additional representation. On the West Coast, the Electrimatic Division of the Simoniz Company is now actively represented by the Russell Sales Company of 1421 South Broadway Los Angeles 15, California, which is under the direct management of Lewis V. Russell. Mr. Russell has been associated with the refrigeration industry for the past twenty years in both engineering and sales work and has established within that course of time a remarkable reputation within the trade. In addition to the office in Los Angeles, Russell Sales Company maintains branch offices in San Francisco and in Seattle which are supervised by capable staff members. The West Coast territory embodies all of California, Washington, Oregon, Nevada, Utah, Arizona and Idaho.

On April 1st, 1947, Electrimatic inaugurated a new territory in Buffalo. This territory is comprised of that portion of New York state west of and including the counties of Jefferson, Oswego, Cayuga, Tompkins and Tiago. William D. Keefe and Sons, who maintain their office in Chaffee, N. Y., have been appointed to represent this area. Manufacturers and Jobbers are familiar with the fact that W. D. Keefe has served the refrigeration industry very capably during the past twenty-five years.

## LINDSAY REJOINS PEERLESS

IT WAS announced recently by Mel W. Knight, General Sales Manager of Peerless of America, Inc., Chicago, Illinois, that Harry W. Lindsay is rejoining the company as their Manufacturer's Representative covering the states of Michigan, Indiana, Ohio, and Kentucky—headquartering in Indianapolis.

H. W. LINDSAY

Mr. Lindsay was previously with Peerless for ten years. During the war he was with the War Production Board and has just recently severed his connections as Consultant on the Board. He is now a full time Manufacturer's Agent for Peerless and associated lines.

## SERVEL PROMOTES SCHMITZ

A. M. "AL" SCHMITZ, Eastern field engineer for Servel, Inc.'s Electric Refrigeration Division, has been named manager of the Northeast District, W. J. Aulsebrook, Servel ER Sales manager, has announced.

As the new manager, Mr. Schmitz will have charge of all New England, as well as up-state New York. He has been Eastern field engineer for Servel since 1935, an appointment he received after serving as field engineer throughout Servel's various district areas. Mr. Schmitz has been associated with the company since 1926.

During World War II, he was Servel's technical representative in Washington, working on refrigeration applications of Servel condensing units for the armed forces and other government agencies.

He is a member of the Refrigeration Service Engineers Society and recently was appointed to the Society's International Educational and Examining Board. Mr. Schmitz and his family live in Albany, New York.

## A. G. ZUMBRUN HEADS BRUNNER MFG. COMPANY

DUE to the retirement of G. L. Brunner, Sr., from the management of the Brunner Manufacturing Company, A. G. Zumbrun becomes Chairman of the Board of Directors and Managing Director of the Company. G. L. Brunner, Jr., continues his activity as President.

Mr. Zumbrun has been active in the Company twenty-two years joining the Company in 1925 as auditor, elected as Treasurer in 1933 an office which he still holds. He was elected Vice President and General Manager in December 1945.

A. G. ZUMBRUN

A. D. SULLIVAN

During this time, he has been active in the management of the Company and is well indoctrinated in the policies of Brunner. Users of Brunner products may be sure of a continuation of the high ideals of Company management and quality production that have always characterized Brunner and made their products outstanding among manufacturers of similar products.

Alfred D. Sullivan has been appointed Chief Engineer, Mr. Sullivan joined the Brunner Organization in March 1945. He holds a BME degree from Cornell University. Prior to completing his education at Cornell, he was engaged in various phases of refrigeration work from 1935 to 1937, operating a service business in Ithaca, N. Y., from 1937 to 1939. Following graduation from Cornell, he became a development en-

gineer for the Carrier Corporation becoming head of Carrier Testing Department on reciprocating compressors in 1944. Up to the time of his appointment as Chief Engineer at Brunner's he was in charge of development research and experimental engineering. He is the author of papers on refrigeration and air compressor applications and an active member of A.S.R.E.

## RANCO LAUNCHES "CONTACT"

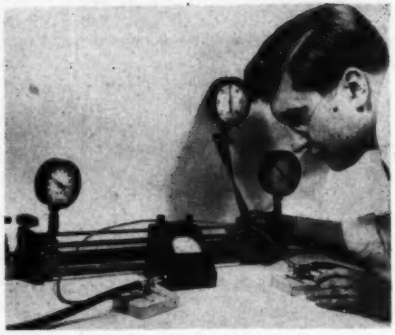
RANCO, Inc., Columbus, Ohio, maker of controls for refrigeration and air conditioning equipment, has launched publication of a new employee house organ titled "Contact." The magazine will be published monthly under the direction of Louie Levengood, industrial relations manager. He will be assisted by 33 other plant editors and reporters for the firm's more than 1,000 employees.

Commenting in the "Contact" on the growth of the company, from a one man operation in 1913 to its present size, E. C. Raney, president and general manager says, "One of the greatest factors in the success of the company is the policy of continually learning what the customer wants and needs, then manufacturing the product to meet this requirement, bearing in mind that performance must be continually improved and the cost of production reduced, to create an ever-expanding market. This policy has been supported by the entire Ranco organization and the success and growth of the company would not have been possible without the unusual teamwork and loyalty of all Ranco employees."

## SCIENTISTS STUDY NEW PHENOMENON

A "HOT-COLD PIPE" 15 inches long and 1 inch in diameter that converts ordinary compressed air into both hot and cold air without the aid of moving parts has been built by Westinghouse Research Engineers. As yet scientists have no explanation for the phenomenon though it is conjectured that the cause may be a frictional effect between gases moving at different velocities. To study the principle involved a working model has been made.

In operation compressed air is pumped into a nozzle at one end of the pipe. There it strikes the inner wall of the pipe tangential to the diameter and is converted into a whirlpool of spinning gases. The air in the center becomes cold almost instantly while



The "hot-cold pipe" constructed at the Westinghouse Research Laboratories. Here engineer Warren Witzig—right hand on the incoming compressed air line—takes a reading. Hot or cold air may be tapped from either end of this model. However, as shown above, warm air is being drawn off at the left end while cold air is coming from the opposite end of the pipe.

that on the periphery gets warm. The cold air is drawn off through a ¼ inch opening at the center of one end, while the warm air is tapped from the periphery.

With the original tube 3/10ths inches in diameter, R. Hilsch, its German inventor, claims to have produced simultaneous jets at 54 degrees F. and 10 degrees F. The present model has purposely been constructed larger in diameter to expedite instrumentation for scientific study. For this reason it gives a temperature difference of only several degrees F.

Low efficiency rules out commercial application at this time, but like the "blue glow" in Edison's experimental electric light that led to his invention of the first electronic tube, it may lead to unexpected developments. Even now it holds promise as a handy laboratory tool for making cold as simply as a Bunsen burner makes heat.

## NEW CATALOGS AND BULLETINS

KRAMER TRENTON COMPANY, Trenton, N. J., have just issued their new catalog R-114 covering Kramer Engineering data. It is a 15-page booklet containing useful application engineering data of everyday value to the man in the field.

GENERAL CONTROLS, GLENDALE, Calif., have issued a new 7-page bulletin on valves and strainers. The bulletin shows specifications and instructive material on the application of their products.

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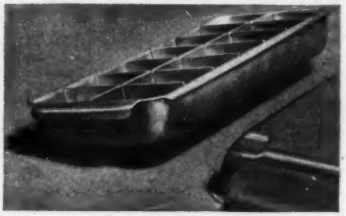

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## Classified Ads

**Rate: $2.50 for fifty words or less, 40 cents for each additional ten words or less.**

FOR SALE—AC motors ½ to 3 h.p., single and 3 phase, list price. Immediate delivery. EDISON COOLING CORP., 310 E. 149th St., Bronx 51, New York, N. Y.

WANTED — EXPERIENCED REFRIGERATION COUNTER MAN. Good opportunity for advancement. Apply in own handwriting, stating jobbing and any other experience, education, and starting salary required. Applications will be treated strictly confidential. J. M. Oberc, Inc., 904 W. Baltimore, Detroit 2, Mich.

FOR SALE—Longest established commercial refrigeration sales and service business in territory. Located in Pacific Northwest. Modern and fully equipped shop and display room. 60′ x 64′ single story tile building, half basement. Complete balanced stock. Seven-room modern house adjoining. Both for $35,000, plus inventory. Address Box MY-3, The Refrigeration Service Engineer, 433 N. Waller Ave., Chicago 44, Ill.

FOR SALE—Sealed Unit Compressors Remanufactured. We offer you guaranteed service on exchange compressors. All makes $36.00 and up F.O.B., Detroit. One year guarantee on mechanical parts and workmanship. We will buy your old Sealed Unit compressors, postage paid $5.00 each. Write us for shipping instructions. Penquin Products Co., 21555 Grand River Ave., Detroit 19, Mich. Garfield 7332.

WANTED—Large Refrigeration Organization in Illinois has opening for service men. Must have at least 6 years actual field experience and be able to handle air-conditioning and commercial service. Must have own car, full set of tools. $1.95 per hour and time and one half for overtime. Can be kept busy year around with excellent earning. Address Box JA-6, The Refrigeration Service Engineer, 433 N. Waller Ave., Chicago 44, Ill.

WANTED—Well known Refrigeration and Air Conditioning Distributor has excellent opportunity for man who has a good background in commercial refrigeration and can sell. Salary and commission $10,000.00 to $15,000.00 per year. Have unlimited number of leads the year round. Fine engineering department and one of the largest service and installation organizations in the country. Must own car and live in Chicago. Write full details giving experience, references, age, etc. Address Box MY-2, The Refrigeration Service Engineer, 433 N. Waller Ave., Chicago 44, Ill.

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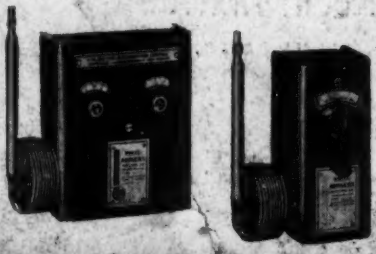

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